



e frequently surprise people with inventive. imaginative software. and people frequently surprise us with the way they use it.

For example, you'll read on this page how Michael J. Watkins of the Petroleum Technology Center in Houston, Texas,

used Turbo Pascal* (and Turbo Graphix Toolbox* and Turbo Tutor") to cut down the tedium and time in creating Circular Performance Profile Charts (CPPCs).

We didn't know they existed, but you learn something new every day!

Applications like CPPCs might not fit your exact needs, but at the same time they might stimulate fresh ideas in your mind about how you can put Turbo Pascal and the Turbo Pascal family to work for you.

And thank you for your interest in and support for Borland International.

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INSIDE STORIES! Turbo Pascal 3.0, already described by PC Magazine as "Language" deal of the century," is now an even beffer deal than that, because we've included life most popular options (BCD reals and 8087 support)

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LATE NEWS!

 June/July Special Arthroad Intelligence Issue of The Micro Technical Journal says, "Turbo Prolog looks like it's going to be a winner, for both the beginner and professional programme

CIRCLE 138 ON READER SERVICE CARD

Turbo Pascal deliberately programmed to go around in circles

Circular charts (or CPPCs) are used by Michael J. Watkins of the Petroleum Technology Center in Houston, Texas, to plot a single performance property for a large number of elastomers, which have elastic, rubber-like properties.

Mr. Watkins wrote us saying, "Because CPPOs condense a lot of data in one graphic, they can be very tedious and time-consuming to draw."

What he did to solve those problems was to write a Turbo Pascal program for IBM® personal computers to denerate these charts ouickly and easily"

He used Turbo Pascal "because it has a companion set of very powerful graphics programs (Turbo Graphix Toolbox) which greatly simplifies the required programming

Turbo Pascal is not a difficult language to use and can be easily learned by persons who can program in FORTRAN or BASIC An excellent tutorial (Turbo Tutor) is available for the novice or experienced programmer. The Turbo Pascal products are also very moderately priced."





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66 Turbo Prolog offers generally the fastest and nost approachable imple station of Prolog



because we have included a complete step-by-step tutorial as part of the 200 page Turbo Prolog Reference Manual Our tutortal will take you by the hand and teach you everything you're likely to need to know about Turbo

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could compare Turbo Pascal to machine language

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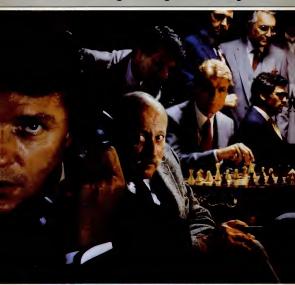


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EXECUTIVE EDITORS	Barry Owen, Paul Somerson
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BUSINESS MANAGER	leis Keittel
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RECEPTIONIST	Iris Luber
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Susan Livery Lysa Saladino

AD PRODUCTION ASSISTANTS EDITORIAL PRODUCTION COORDINATOR Burbars Ross Mariorie Dumashek, Melvin Foster-Poetsch, Linds Harres PRODUCTION SYSTEMS One Park Avenue, New York, NY 10016, 1212) 503-5100

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PRESIDENT	Kenneth H Kennel	
SENIOR VICE PRESIDENT, MARKETING.		
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COVER STORY

Page-to-Disk Technology: Nine State-of-the-Art Scanners

Tom Stauton, Diane Burns, and S. Venit/What a great idea: a machine that converts pages of text and graphics to disk files for storage. But until this year, these machines, called scanners, had been expensive. clunky, and inaccurate. Now. much improved and less expensive, they are poised to enter the office mainstream......128

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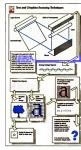


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Micro-to-Mainframe

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WHAT'S INSIDE



Mark Twain was the first major writer to use a typewriter, a Remington on which he wrote Huckleberry Fium in 1884. In the hundred years since then, a good deal has changed in the way we create text. But one thing remains stubbornly low tech: the keyboard. In fact, if you think about it, using a key-

board to create text is downright primitive.

Voice technology is beginning to offer a realistic alternative.

But until voice-recognition devices can understand words the way
most people speak them (fast), business users are unlikely to trade
in their keybourds for microphones.

The greatest keybourd limitation is speed. Even power users who started out a sping starm in high shool can't create lext any lester than their fingers can carry them—shout 70 words per mine the While 70 women in so hosd for writing drafts, it's mutder for converting paper copy—the waves of reports, summaries, news esclesses, memors, clippings, and excepts that flood your office daily—to dish flies. So most offices continue to organize, store, and review so set information the old-Indulosced way: in new upon and review so set information the old-Indulosced way: in new upon

The solution is scanners. This rapidly developing page-to-disk technology brings the efficiency of the PC to the problem of organizing, storing, and retrieving paper files. For a full report on the state of scanning technology and reviews of nine new products, see page 128.

Evaluating products in PC Magazine requires experts, lots of them. In this issue, for example, G. William Duaphinias and the Price Waterhouse crew bring the best expertise available to a review of Open Szernes Accorating Software. Bill Harts, Charles Teets, and M. David Stone, three specialists equally comfortable on both ends of the micro-to-mainfrane connection. Huminate the complex, increasingly more important subject of remote 3270 terminal emulation (page 235).

For some product categories, locating objective experts to expectably difficult. There earls, for example, every many scanner specialists around. Tom Stanton, who headed the review team for the scanner cover story in this issue, is such a specialist. Stanton's interest in these products is very personal. "I've alweys been fascilled to the products in the products in the products in the standard in the products in the products

COMMITMENT REPORT

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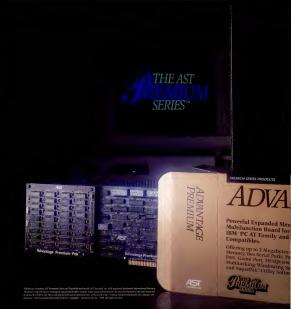
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LETTERS TO PC MAGAZINE



PROJECT DATABASE II

We were a bit surprised by your treatment of our product filePro 16 Plus ("Programmable Relational Databases," PC Magazine, Volume 5 Number 12). Both the table and the review contained several errors and misleadine statements.

For instance, the table should have indicated that floating-point calculations and date conversions are features of filePro 16 Plus. In addition, filePro 16 Plus features predefined mailing labels and data import/export for DIF, SYLK, and user-defined data.

I also find the comparison between the filePro 16 Plus procedural language and dBASE slightly misleading. dBASE is more or less a programming language, while filePro 16 Plus is menu driven. Thus, filePro 16 Plus does automatically many jobs that you must program in dBASE.

Our biggest surprise, however, was John Phillips's complaint that file Pro 16 Plus is complicated. Only once did mention that complexity relates to flexibility. Flexibility was our goal with file Pro 16 Plus, which we never recommend to novices. Instead, we suggest that users start with file Pro 16 and upgrade to Plus only if they need the extra development features.

Sherry Gench
The Small Computer Co.
New York, New York

John Phillips replies:

As I stated in my article, filePro 16 Plus is feature-rich and fast, and it contains several slick features. However, I found that the product was outclassed by the five other Category 3 (programmable relational databases) products I reviewed.



I betieve a modern system shouldn't have to be told to remain in drive C: after being installed in that drive. And no software should require ten new subdirectories just to install the system and a tutorial. To me, these things are important in a \$000-nlus product.

Since you like R-hour Series 5000 enough to make it your Editor's Choice in "Programmable Relational Databases," perhaps you would be willing to buy my copy. I purchased this program because of the fivorable press it has received, however, you needing the documentation and working with the program for several days, I discovered R-hour Series 5000 is unsuitable for anything but the simplest database tasks.

For example, I was initially led to believe that the program would allow me to have 40 distinct tables, each having a maxmum of 400 fields and J.532 bytes per record. Unfortunately, I discovered that the 400 fields and J.532 bytes are absolute maximums, which must be shared among all of the allow. How is if that the reviewer could omit mentioning such vital, and potentially crimitel. Ilmitations?

> Paul H. Hooverson Recourse Computer Services Fort Collins, Colorado

| Vincent Puglia replies:

Your figures are correct; I am sorry you assumed R:base Series 5000 allowed 16,000 fields and 61,280 bytes per database. However, your problem may have arisen from the assumption that tables, files, and databases are one and the same.

An few Pubers Series 5000 being warning

As for R-base Series 5000 being unsuitable for serious database tasks, it may be that your applications require more power. If that is the case, you either need to get a more powerful database (the new version of R-base Series 5000—R-base System 3—allows 800 fields per record and 4,096 bytes per field or record. If you purchased R-base Series 5000 differ January 1, 1986, the upgrade costs 599) or redefine your application.

Congratulations on your database reviews in "Programmable Relational Databases." R:base Series 5000 deserves to be an Editor's Choice. As a productivity tool with full-power features for business and professional use, R:base Series 5000 is clearly the new database standard.

R.J. Lahey St. John's, Newfoundland Canada

We were very disappointed with Bill Hart's review of the VersaForn XL database in "Programmable Relational Databases." In the entire review, no mention was made of its detail lines, the one feature that sets VersaForn XL apart from and above every other database we have used. Detail lines allow the user to create columnar fields that will add a now line every valuable tool for generating accounting applications. Although we realize it is postable to program other databases to emulate

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VIEWPOINTS

■ LETTERS

this concept, we prefer to stick with Versa-Form XL and avoid that complicated and time-consuming process.

Steven Tablak Tamtron San Jose, California

A VOTE FOR ENABLE

As one who has been using Enable software for more than a year, I was quite interested to read Alfred Poor's comparison of this outstanding package with Framework and Symphony ("Integration with Integrity: Framework, Symphony, and En-PC Magazine, Volume 5 Number 11). His review confirms my opinion that Enable is the cream of the crop. I agree with his comment that Enable is the one program to do it all. It certainly has for me. John M. Shinala

Cumming, Georgia

HUNG UP IN SETUP

I recently downloaded the SETUP.COM program, a utility that lets you send setup control codes to your printer (Programming/Utilities, PC Magazine, Volume 5 Number 12), and I must say it is fast becoming a favorite. However, the combination of SETUP.COM. SuperKey, and

 As a productivity tool with full-power features for business and new database standard.

professional use, R:base Series 5000 is clearly the SideKick brings my system to a screeching

halt. In stripping off the programs to locate the exact cause of the problem, I discovered that it occurs when SETUP.COM is running with SuperKey. Is this a problem of incompatibility among multiple memory-resident programs, or is it a problem unique to my system? Robert B. Fairley

Stamford, Connecticut

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PC MAGAZINE - SEPTEMBER 30, 1986

LETTERS

Incompatibilities among memory-resident programs-especially those like macro generators-are so rampant that a number of software manufacturers recently convened to see if some order could be im-

SETUP.COM, which

lets you send setup control codes to your printer, is fast becoming a favorite.

posed on the chaos. Reportedly, one major company even offered to put its proprietary keyboard handler into the public domain if others would use it to eliminate the conflicts.

Although this and alternative ways to manage multiple memory-resident programs are being explored, at the moment there is no simple answer. We're sorry if some of our program offerings can't coexist with some of our readers' favorite commercial packages (and we will report known conflicts), but we can't always undertake to resolve them -Fd.

TEPID TESTING

In his editorial column "The Product Intro Dilemma" (PC Magazine, Volume 5 Number 8), Bill Machrone stated that PC Magazine works "extensively with manufacturers under nondisclosure agreements," which he said reflected an "If we don't test it, we don't write about it" policy. But I have noticed that, with the exception of your product category-specific evaluations (for example, Project Database), the reviews are almost as strong as warm milk.

I recognize that PC Magazine is caught in the middle, serving two masters. On the one hand. PC Magazine wants to ensure that consumers continue to read its reviews. On the other hand, it wants to ensure a steady supply of products to review, for surely you don't actually pay for all the products you write about. The raison d'être of publications such

as yours is not to supply blurbs for product ads: it is to supply information to consumers who want to spend money on useful products. Most products have foibles as well as fortes; let us know what they are. Bradford S.J. Young

Charlottesville, Virginia

Bill Machrone replies:

Right now, at least half a dozen manufacturers who have gotten bad reviews would beg to differ with you. We stand on our record.

CORRECTIONS

The correct phone number for General Optimization (PC News, page 36, PC Magazine, Volume 5 Number 13) is (800) 441-BEST or (312) 248-7300.

In a response to a letter to PC Advisor (PC Magazine, Volume 5 Number 6), we incorrectly stated that Microwriter was no longer on the market. Although reorganization halted Microwriter's operations in North America, the product is still available in the United States at a price of \$499 and can be ordered from Futur Soft Inc... Rte. 11, Mooers, NY 12958.

The correct phone number for Software Systems Technology Inc. ("Programmable Relational Databases," PC Magazine. Volume 5 Number 12) is (301) 779-5486.

The review of XDB ("Relational Databases," PC Magazine, Volume 5 Number 12) should have been placed in Category 3 (programmable relational databases).

HOW TO WRITE TO PC MAGAZINE

Do you have a comment, compliment, or criticism about something you've read in PC Magazine? A question you'd like to open up to other readers? Then send a letter or disk to Letters to PC Magazine, One Park Avenue, New York, NY 10016, or send your comments through MCI mail to PCMAGAZINE at address 157-9301. We're sorry we're not able to answer letters personally.

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What's it like to use it? If you have ever worked with or seen a RAM Disk you know what a difference speed can make when working with any program that frequently accesses the disk. Well, LIGHTNING

enables those programs to approach the same rapid speed as a RAM Disk, but it does it without the disadvantages. With a RAM Disk there is a constant danger that you can lose your precious data if you forget to copy it back to the disk drive. With UGHTNING vou just use your programs normally. You don't have to remember any-

LIGHTNING has a fun feature that shows you just how fast you're operating. Any time you want, with a couple of keystrokes you can see a screen that keeps a record of how many times you've accessed the disk, and how much time LIGHTNING has saved you. It's fun to check it out, and it's always astounding. Speed-up varies, depending on your application, frequency of disk access, and amount of RAM you can allocate. For example, best results occur with indexed databases.

When you work with a database program or most word processors, or any time you need to frequently load files into RAM or save them back, you are accessing your disk. It is such a pleasure to cut those times often in half and up to one-fourth. Spreadsheets can speed up their loading

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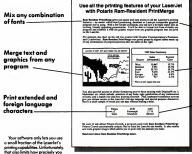
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attachment of field-specific help messages

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source, so you can modify it to fit a special case. No revoltes provided you bind it into

number of users to access an index file

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smultaneously even when updates are in progress. So multi-user configurations and

Record-locking routines are provided for

tree's design splits nodes to allow any

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and functions and functions

decide which keys will clear a field, jump to the next or prior, quit, etc. Options diverse enough that a set of "fields" can be made to behave like a Lotus 154 megu Les PC Brac 1985 1149 T0150 Windows for Data 1295 MICROSOFT C 4.0 A Great C Battle Rages and You're Winning

other with ever heavier ordinance. ay's programmers reap the spoils of this war Bundling a source debugger and a "make" and sporting a "huge" memory model permitting single data objects larger than 64k the Microsoft C compile has sumped a full vestion number to 4.0. But what's really impressive are the bench marks reported in Dr. Dobbis (8/86) encyclopaedic survey of 17 C compilers Microsoft's and IBM's C (igensed from

Microsoft) run away with the contest wirrung 11 of 27 benchmarks. The CodeView¹⁶⁴ debugger, free for a rated time, uses wandows to show ever disagnembled object, variables, stack and registers. Drop down windows if you like-obviate learning of commands. A source-level debugger that puts the rest

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Assembler Object code of all four may be

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PFORCE Phoenix Pfunctio

Louse didn' do badly pulling it all together in one place. Phoenix has follow-ed sur with the ultimate integrated C library, offering everything from low level ability, descript everything both now when furctions for hardware access to complete bure database management. Along the way are precognists such as string manupalation, translating field and screen editing, but also four styles of menus (Lotas modeled). I wandersom benderman editing, but also four styles of menus (Lo uncluded), windowing, background use-ing, DOS interfaces, diructory manage-ment, even interrupt-driven communica-tions. Design emphasizes objects, so characteristics of windows, databases, records and fields can be interfaced and

changed outside functions. One large collection in place of bits and pieces means one set of instructions and PforCeTM has totonals, extensive examples, auck reference, and on-line help.

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DAN BRICKLIN'S DEMO PROGRAM Storyboard Your Program

he Legendary One has created Metaphor Two when the rest of us are still on Zero. Daris first was the original electrorac spreadsheet (VisiCalc **) This one is for programmers.
Words don't express program id because programs are screens! Dan's

Demo creates slide shows. Create a screen — a snapshot of your planned pro-duct as it runs. Anything goes words, borders, box rules, merge and underline of monochrome, fore- and background color Copy this "slide" to an empty screen color Change it a lattle, to show the next instant of run-time Do it again Preso a whole slide show of your program in action All 290 characters and attributes are available from scrollable lists which pop to the screen. All commands are layered in Louis style pop-up menus. Frequent

choices mapped to function loss as well

80x25 character mode, not bit-m passe or filled with color or charact even blank Stides can overlay on others. peed at time intervals or branch amy

m the side sequence depending on user Invaluable to prototype the program you are about to write, to position the labels, keystroke interface. Or load the "capture unity and snapshot the screens of any run Each copy entitles you to redistrib of the side projector program that runs demos. Plam manual, no binder keeps price of big product small "Might become the essential tool in user line

BASTOC OPTIMIZES Translates BASIC Into C

F or e trilling proce. BASTOC™ move truckloads of BASTC code over to C it's a translator which takes in Microsoft Extended BASIC and emits pure K&R C for Lattice 30 It will opporally convert ur program into a single monolithic C function or decompose it into separate functions, one for each GOSUB label Version 2s opt each OCOUS label.
Version 2s optimization dramascally reduces execution time. Converts to integers those variables in BASIC programs which do not need floating point. Where which do not need alosing pour. **Here BASIC uses full assignment statements to increment counters, BASTOC converts to C's compact form. Strings dynamically allocated inditing your application of BASIC's casaonic halls for garbage collection. Creates structure of even convoluted BASIC code Huge worksaver

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C-86 Compiler Computer Innovations Lattice C Compiler from Lence Let's C Compiler by Mark Williams with CSD Source Level Debugger WWC-85: Merk Williams C Development Microsoft C Compiler 40

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integrated development environment a complete K&R interpreter bound tohily to its own editor and debugger Sice through programming projects like

RUN/C PROFESSIONAL C Interpreter Links

Binary Libraries R un/C comes in an apprentice and proversion. The professional model dynamically loads and unloads multiple brany function libraries like C-Food. Smorgasbord™ and Halo Craphics™ potentially any library compiled with stroes large model Inside this inter preter your C program can reach for functons in the best of commercial libraries This C interpreter behaves like PC BASIC nees WordStar* Use fullacreen editing mees wortstar "Use function eating to create a program RUN # If # stumbles. LIST #, EDIT #, RUN # again, for # again, Use familiar commands like LOAD, MERGE, SAVE, FILES, even TRON and TRACE Ideal for program development. Put up code at high speed, try out things devi-may case, let RUN/C find your malacrons may case, on notive and your memories Blast away until tight liftle code segments are undyingly faithful.

Lots more features system intermines a shell command to invoke any operating system command without leaving Run/C. debugging aids ingeniously installed as a Run/C function. Call for debugging condibonally from within your program, a specific function or a menu of aids in-cluding stimediate mode, single-step tracing, changing of variable values. Marual shows how to develop the inter face to a commercial library, using the Las tice compiler (a must). Link your own function arctive the same way (320k minimum. 512k recommended to ft library Ask for S0960 Lat. 1250 PCR 1385

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which leave source code behind 100% computer compatible — notif down to beader files and library calls. Port pro-grams between Interactive-C and your compiler with no modifications whatever ... not even tricky areas of dynamic memory allocation and I/O Let PC Brand PS60 & Compiler 1239 1249

GSS GRAPHICS SYSTEM Leave the Device Driving to GSS ANSI CGI STANDARDI

G SSTM has reconfigured two compo-nents of its companhensive graphics tools to conform with the ANSI Computer raphus Interface (CCI) standard ment Toolkit which contains all language meriaces and device drivers for key boards more systicits, tablets, printers, plotters, cameras, and more. Drivers house management of vector graphics (pioters) gram from concern for device schorymoracy No one else has implemented CGI that way it means your programming remains

program will draw a different device CSS Kernel^{1 or} conforms to lewel 2b ANSI's Graphical Kernel System (CKS) and contains all its needed drawes and language bindings. Kernel has macro level tools to draw and color an object, store the sequential instructions, and recreate the objection as own, as well as segment it, transform it, etc. So powerful, a sangle or mand may represent several score lower Plotting has the equivalent CKS tools for graph and chart generation and their can noning hand it apples and cranges, say "rue" and it bakes the numbers into a

igestable display for screen or pioners Kernel and Pictung have tools to convert rages they crease to ANSI Computer key in a million in four or less accesse Files may have up to 24 indexes, fixed record length to 4090 characters, indexes Graphics Metallies (CCMs) a mkenged standard for storing every form of graphic image as data. The Messille Interpreter up to 255 characters, files of 4 billion bytes TERMS AND CO TIONS OF SALE

Major Upgrades to the Best Selling C Compiler

to assion stepped values to variables, data assing between structures by assignment. The creativ expanded libraries (325) long that developers have created far more snap-on tools for Lamon C than any functions!) enable the file sharing and record locking provisions of DOS 31, pro vide a full complement of transcends and a host of utilities to manuc the UNIX and XENIXTM environments. Lattice 30 defaults to the ANSI proposed standard when you need strict adherence

but command line options restore leavency And a adopts ANSI checking of external function arguments by data type to kill bug swarms when modules you up at link time

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PC ADVISOR



 $Help {\it for readers in avoiding legal problems when setting up a network and in keeping detailed records of computer use for internal operations or for generating invoices.}$

A BAD WAY TO START A NETWORK

My clients are confused as to copyright law and the number of applications programs they must buy per network. They see networking as a way to save money on software.

Is it illegal to buy one copy of a program and have it available to others on the network without the publisher's permission? Since the illegal copies of the program are stored in RAM, they disappear when the computer is turned off. Violations of copyright law by network users are nearly impossible to prove.

Douglas W. Baty Sacramento, California

Your clients are being penny-wise and pound-foolish. At the same time copy protection is coming off many programs, software publishers are stepping up efforts to catch software cheats.

U.S. copyright law expressly prohibits the copying of software programs; the only the copying of software programs; the only permissible copy is a personal backup. Under common law, the licensing agreement printed on software packages may not be bindling (that's an issue that lawyers could argue over), but some states are in the process of passing lows that codify and legitimate these licenses. Illinois and Louisiand have already done so.

Proving a case of illegal copying is very easy to do: testimony by employees about their work on the network would make excellent evidence. In fact, in virtually all the cases in which software publishers have obtained out-of-court settlements from businesses for unsanctioned copies, the publisher was alerted by a disgruntled former employee.

(There are a few publishers that condone sharing. Borland International's license agreement allows use "by any number of people...so long as there is no possibility of it being used at one location while it's being used at concluder."

while it's being used at another.")
In addition to the legal problems, nonnetworked software can turn into a logistical niehtmare on a network: multiple ac-

networked software can turn into a logistical nightmare on a network: multiple accesses to a file can cause confusion and irretrievable data loss. Many software publishers are marketing networked versions of their programs. For example, R.base System V is sold as networked or personal software for the same price.

Considering the great legal expense a business faces if it's caught using copies and the risk of being "turned in" by discontented staff, buying the software you need is a prudent investment.

■ At the same time copy protection is coming off many programs, software publishers are stepping up efforts to catch software cheats.

TRACKING PC USE

I'm interested in tracking the use of 100 PCs. I would like the program to be user friendly, RAM resident, and able to list use by time and type of application.

Jeff J. Riddle Greensboro, North Carolina

Simple, undetailed logs of computer time can be created by writing your own batch file. A bare-bones approach was demonstrated in PC Lab Notes (PC Magazine, Volume 5 Number 6)

We've looked at programs that not only purport to log time used, but compute idle time as well; unfortunately, they are too buggy and crude to recommend.

An applications organizer that is on cccellent management tool for tracking the activities of a stable work force in Direct Access (Delta Technologies, Eau Claire, Wis.; (715) 829-995; 889-95). Centered on a password-restricted access core, it organizes applications into a meu while storing fairly detailed usage logs, including summaries for each application.

Businesses that generate invoices based on PC work will love Timeslips (Northern Edge Software, Hamilton, Mass.; (617) 468-7358; \$99.95). It records usage, calculates billing rates, and has an array of features than will aid in printing mailing labels, usage charts, and detailed, professional-quality invoices.

ASK THE ADVISOR

Send your questions to the PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016.

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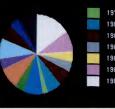
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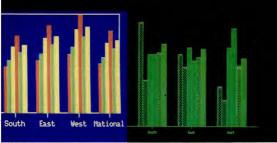
AutoSwitch. Only Paradise has it.

The Paradise AutoSwitch EGA changes video modes automatically to work with your software. No Mode commands. No special software to run. On RGB monitors it "autoswitches" between EGA, CGA (IBM Color Graphics) and Plantronics modes, on monochrome

monitors between EGA, MDA (IBM Mono Text) and Hercules modes. The Paradise AutoSwitch EGA runs any PC software you want Immediately. Automatically. That's something ordinary EGA Cards can't do.

Runs all EGA, CGA, MDA and Hercules Software with true hardware level compatibility.

True hardware compatibility makes the Paradise Auto-Switch EGA Card different from other EGA Cards. No other EGA Card offers the



CGA Mode

Hercules Mode

d That Automatically ur Every Mode.

6845 CRT controller included in the IBM Monochrome. IBMColor and Hercules Cards. The Paradise-designed PEGA video controller chip has the equivalent of a 6845 inside. That means when the Paradise AutoSwitch EGA runs EGA software, it's an EGA card; when it runs IBM Color Graphics (CGA) software, it's a CGA card; when it runs Hercules software, it's a Hercules card, No "batch files," special software or complicated installation. No incompatibility hassles. EGA with true 6845 hardware compatibility. Only

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possible all this function makes
possible all this function
and intelligence on a short
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FIRST LOOKS

Store-Label PC's Shake Up Market

HANDS ON

BY WINN L. ROSCH Armed with the double-barreled benefits of lower prices and IBM's own secret weapon-super support-two leading PC retailers, ComputerLand and Businessland, hope to cash in with house-brand computers. Backed by nationwide dealer ise you the added measure of peace of mind; someone nearby who can service what he sells. and someone you can call upon when something goes wrongat the price of only a local call.

The ComputerLand BC88 is a throwback. Unlike almost every other PC compatible now marketed, it's a bus-oriented networks, both the Computercomputer reminiscent of the S-

Land BC88 and the Wyse I 100 machines of yesteryear that PC286 by Businessland promwere eclipsed long ago by the

PC fireball. The BC88 has no system board per se. The deceptively simple and well-made system unit is lined with a row of eight edge connectors, six of them using an AT-style, 16-bit bus, with the rest matching the PC standard. All system board functions are squeezed onto two

normal-size expansion boards.

This unusual architecture makes the BC88 unusually flexible and allows your Computer-Land dealer to customize each system to your heart's (and budget's) content. In fact, the whole personality and power of the system can be changed with the ease of replacing a few multifunction cards. The PC-compatible BC88 can thus be upgraded into an AT-compatible BC286 by substituting a threeboard 80286 CPU board set for its two-board 8088-2 set. (No provision is made to expand into 80386 territory.)

In the BC88, one board is the actual central processing unit and the other a multifunction card, supplying system memory (up to 640K bytes: 256K is stan-(continued on page 34)

PC's Ltd. Breakthrough: 16-MHz, \$2,995 Screamer

PC HANDSON

a run for their money.

BY PAUL SOMERSON Michael Dell, the innovative 21-year-old chief executive officer at PC's Limited, has just thrown the high end of the industry for a loop with his 286 16, an AT-compatible micro that outperforms everything else in sight-and may just give the first round of 386 machines

If you've ever daydreamed about climbing into the computer equivalent of an F-18 jet. punching the throttle, and blasting straight up into the clouds. sit yourself down in front of one of these. Beside it, any other AT compatible is a Piper Cub. And everything else is just welking. In lead boots.

This 16-MHz screamer tore

the top off every test PC Magazine Labs threw at it. Dell's motto is "Give 'em what they want " And what they get is rock-solid construction in a



turning digital PC AT, PC a Limited with a 16-MH: 286. The firm now has 8-. 10-. 12-, and 16 MH: AT comparibles

compact box, clever design, a very high level of IBM compatibility, neck-snapping speed, and a competitive price tag.

Greased Lightning

After a few hours at 16 MHz, a lumbering IBM AT feels like a dusty relic from a computer museum. On the 286 16, screens popped like flashbulbs. Software sprinted through ordinarily languid tasks at a dizzying pace; you have to see WordStar at 500 miles per hour to believe it. The 1-2-3 WAIT message would get only as far as WA. Even Microsoft products ran with uncharacteristic zip.

Just Under \$3,000

Dell is selling a megabyte of Tournescool DRAM, a 16-MHz AMD 80286 CPU, 8-(continued on page 35)

HANDS-ON INDEX

COMPUTERI AND

BUSINESSLAND PCs Compatibility, more speed

and modest savings 33 PC's LIMITED 286 16

Twice as fast as a PC AT and

WEBSTER'S

NEW WORLD WRITER Superior features in a \$150 word processor 36

Word processor adds a mail-

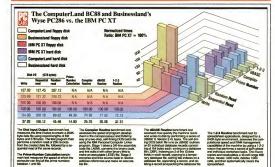
ing list and link to 1-2-3.36 MICROSOFT C 4.0 CodeView allows full-

screen debugging...... 38 ADAPTEC CONTROLLLER RLL coding increases hard

disk storage 50 percent .. 46

Use AT extended memory as expanded memory 54

REFEREE Effective manager for RAM-resident programs 54



House Brands

(continued from page 33) dard equipment), a parallel port, a serial port, a clock, and a floppy disk controller. Other manufacturers' multifunction boards cannot be substituted

Outside of the unusual internal layout, little else is remarkable about the BC88. Its twospeed, eight-bit processor performs on a par with an ordinary PC (at a 4.77-MHz clock speed) to about 1.7 times better (a 8 MHz), according to Norton's Syslafto test.

The BC88 comes complete with GW-BaSIC and MS-DOS 2.11, but the latter caused the only incompatibility I encountered with the computer. When I formatted its hard disk with that operating system and later booted the machine with PC-DOS 3.2, writing to the hard disk destroyed the file allocation table. Although the problem is probably software-related, I would be wary of mixing operating systems on the BC85.

The BC88 has a mixed parestage. Although it bears the ComputerLand label, the machine is imported by GreatWest Technology, a wholly-owned

ComputerLand subsidiary. The hardware is actually made in Korea by Tri Gem. and the ROM BIOS bears a copyright notice attributing it to PCPI. The Wyse PC286 by Busi-

nite wyse recool of businessland is an unabashed AT clone. Although on the outside it's refreshingly different—painted a richer beige color and displaying a beveled control panel—inside it features the IBM AT layout we've all grown fond of: eight expansion slots (six with full 16-bit bus) and montrivaless condeficient to

(six with full 16-bit bus) and two drive bays, one dedicated to a full-height hard disk and the other capable of handling up to three half-height devices. The Wyse-cum-Business-

land processor is an 80286 with two speeds, switchable by a front-panel pushbutton or through DOS. The slow speed is an AT-compatible 6 MHz that delivers a performance rating of 5.9 on Norton's Syslinfo test. High speed is a balzing 10 MHz (with one wait state). Remarkably, at that speed the PC28 scored a whopping 16.7 to 20.0 on Swelaffe

One clever design aspect ensures that the PC286 will be compatible with the widest variety of accessories. Even when high-speed operation is selected, the clock speed of the data bus is held to 6 MHz, except when memory is accessed. Hence, no high-speed stress is forced onto other system peripherals, and only memory expansion cards need be canable

of handling 10 MHz.

A full 640K bytes of RAM is standard, as are a clock and GW-BASIC (but not MS-DOS). Parallel and serial ports are optional, as is DOS.

A 1.2-megabyte floppy disk operated by an IBM-style Western Digital combined floppyand-hard disk controller come standard. The Seagate 20megabyte hard disk in the evaluation unit matched the speedy 80286 microprocessor well and turned in a 3-millisecond aver-

Equipped with a Phoenix ROM BIOS, the Taiwan-made Wyse PC286 for Businessland is commendably compatible. I encountered no problems with any IBM software, whether running the MS-DOS 3.1 eperating system normally supplied by Businessland or PC-DOS

age access time.



ComputerLand BC88 ComputerLand Corp. 30985 Santana St. Hayward, CA 94544

(415) 487-5000
List Price: \$1,495
In Short: A compact, (wo-speed, bus-oriented, PC-compatible computer, upgradable to an AT compatible by substituting expansion boards. Tested 70 percent faster than a PC.

Wyse PC286 for Businessland
Businessland Inc.
3600 Stevens Creek Blvd.

San Jose, CA 95117 (408) 554-9300 List Price: \$3,295

Requires: MS-DOS 3.0 or inter (MS-DOS 3.1 is \$75 from Businessland) In Short: A fast (10-MHz clock), two-speed AT compati-

ctock), two-speed AT computble with AT features and expunsion capabilities.

CIPCLE 435 ON PEADER SERVICE CAPD

PC's Ltd. 286 16

MHz DMA, a 200-watt power supply, eight expansion slots (one of which is filled by a combination hard/floppy disk controller), a 1.2-megabyte floppy disk, and an AT-style keyboard, for \$2,995. You can substitute a 360K-byte drive for \$26 less. (A 12-MHz version goes for \$2,695, but no power user in his right mind will want it since \$300 kicks the performance up a whopping 33 percent.)

Small but Roomy

On the outside, the 286 16 closely resembles its 12- and 10-MHz siblings right down to the LED ticker-tape SmartVu display adjacent to the lock. It's available in the now-standard small-footprint box, which holds up to three half-heights, or in a larger IBM-sized chassis, which can shoehorn in more or

larger drives While the slower PC's Limited AT versions default at bootup to a 6-MHz clock speed, the 286 16 starts out at 8 MHz. You can add a short program to your AUTOEXEC.BAT file to crank it up to 16 MHz, or you can tap out a Ctrl-Alt-Backslash at any time to toggle back and forth. An internal DIP switch lets you reconfigure the steady poweron front-panel light so it blinks only when in turbo mode

A Different Breed

Under the hood, the 286 16 is far different from other hardware stamped out by PC's Limited-or anyone else. A massive heat sink surrounds the CPU to cool it down. A generation of new support CMOS chips fans out from it to shuttle data at a rapid clip. A 14-pin DIP-compatible oscillator, rather than the standard two-lead crystal-in-a-can, drives the clock. And a sleek new BIOS handles all the details. (On our early test model, someone had scribbled a single word on the labels atop the BIOS chips-Ultra. The description is apt.) PC's Limited wrote a large

chunk of the BIOS itself. The machine we tested came with the PC's Limited EGA card (a real value at \$269) and a

PC's Limited 286 16 vs. the IBM 8-MHz PC AT

		NOP 128K bylee	Fier point ca	Norton'e Systate	
IBM 8-MHz PC AT 8-MHz Mode	4.17	(2.42)	34.41	(4.51)	(7.02)
PC's Limited 16-MHz AT 18-MHz Mode	2.09	(4.84)	16.72	(9.28)	(15.17)

Note: test results of the IBM 8-MHz PC AT and the PC's Limited 286 18 running in 8-MHz mode were identic All times in seconds. Figures in parentheses indicate performence index reletive to IBM PC (Ratio: IBM PC = 1).

The 128K NOP benchmark test is designed to measure raw clock speed and memory eccess time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in e big 128K loop.

FLOATING POINT CALCULATION The Floating-Point Calculation benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentials, and logerithmic and trigonometric functions. The test progrem uses the floating-point library included with Microsoft C 3.0.

HORTON'S SYSINFO System is a widely-used speed test that is sensitive to processors with pipelined architecture, such as the NEC V20 and the

The \$2.995 PC's Limited 286 16, when operating in the 16-MHz mode, is twice as fast as a stock IBM PC AT, which can only reach a clock speed of 8 MHz. This machine had no incompatibility problems running any of the software we tested.

crisp \$479 Mitsubishi ECD monitor with color handling as good as any we've seen. It also sported two half-height 40megabyte hard disk drives: a 35millisecond version from Tandon sells for \$895; or you can order a 40-millisecond, 40megabyte drive from Seagate for \$819 (However, neither drive was exactly what you'd call nimble.)

The standard AT-style keyboard was a bit mushy for those accustomed to heavy IBM springs; I plugged my IBM-issue keyboard into the back of the PC's Limited, and it worked just time. One nice touch: on the underside of the feather-light PC's Limited Maxi-Switch keyboard is a toggle that lets you put the Esc key back where you're accustomed to finding it. Dell expects to have a new 101key IBM-compatible keyboard (and some other bold announcements) by September.

20- and 24-MHz Versions Although Dell admits he's toiling away on 20- and 24-MHz versions, he says there's more to the speed problem than just brute force, "We don't believe in just turning up the clock to make it go faster. We believe in integrating all the I/O relative

to the speed. He runs his DMA at half the clock speed of the central processor; competitors like IBM and Intel choke it down to a quarter. Dell claims his 12-

MHz machine runs nearly as fast as some of the better-known 80386 boxes just coming on the market, and that this new 16-MHz machine actually runs 20 percent faster than some 386s he's tested.

In fact, Dell and his chief scientist, Jay Bell, ascribe much of the success of the 286 16 to advanced design work for a generation of 386 machines they're readving for the market.

Nothing but the 386

Dell claims that "no other innovative engineering is going on in the PC business." If you think that sounds like puffery, look at the glut of me-too hardware on the market and try writing down everything that's truly new. Short list.

And, according to Dell, "This is only the beginning. While the 286 12 is okay and the 286 16 is pretty good, our researchers in Austin are working on a brand-new standard-a whole new approach in areas like disk access that will give you speed multiples eight to ten times greater a year or two down the road."

From some other manufacturers such a statement would be pure vapor. But after prying myself away from his beige bitblazer, I'm a believer, not all the rockets from Texas say NASA on the front. Bargain-basement. clones are nibbling away at the PC marketplace, but the hearts and minds of corporate America

are still in a gluelike IBM grip. It's going to take machines like the 286 16-which offer breathtaking performance gains and irresistible value-to wrestle them free



PC's Limited 286 16 PC's Limited 1611 Headway Circle, Bldg. 3 Austin, TX 78754 (800) 426-5150 (512) 339-6800 List Price: \$2,995 (with t megabyte RAM, single 1.2megabyte floppy disk drive,

eight expansion stots, 200-wan power supply, configurable PC AT-style keyboard): \$2,969 (same features as above but with a single 360K floppy disk drive); optional Tandon 40megabyte, 35-millisecond hard disk, \$895; optional Seagate 40 megnityte, 40 millisecond hard disk. \$819; EGA card, \$269; Mitsubishi ECD monitor, \$479; Wangtek internal 60megabyte tape backup, \$795. In Short: One of the first real potential "IBM killers." It's so intelligently designed, ruggedly

constructed, highly IBM compatible, reasonably priced. and astoundingly fast that it'll leave skid marks on your desk. CIRCLE 444 ON READER SERVICE CARD

New World Writer: Helping Hand for Writers

HANDS ON BY CHARLES BERMANT

The distinctions are starting to blur. PC word processors can usually be put into one of three categories-personal, professional, and corporate-but the document-oriented Webster's New World Writer falls somewhere between professional and personal. It is faster and more powerful than the best personal systems, like PFS:Write, but it lacks functions like mail-merge

and the ability to window files. Still, professional writers should find that this \$150 nackage compares favorably with both XvWrite II Plus and Words Perfect. It includes versions of the powerful Webster's New World Spelling Checker and Webster's New World Thesaurus (altered so they can be used only with New World Writer).

On the \$150 Webster's New World Writer, the Esc key brings up the command line You can type the first letter to choose the command, or move the cursor and press Enter.

New World Writer is remarkably casy to learn. The Esc key brings up the command menu. Commands can then be entered either by moving the cursor over the command and striking the Enter key or by typing the command's first letter. Or if you're

working in the document. the commands can also be accessed through Alt key combinations. such as Alt-B for bold or Alt-U for underline.

Boldfacing and underlining show up on-screen, as do double and triple spacine and right-



Webster's New World Writer Simon & Schuster Software Gulf + Western Bldg. One Gulf + Western Plaza New York, NY 10023 (800) 624-0023 Lisa Price: \$150 Requires: 256K RAM, DOS 2 O or taken In Short: A word processor for creative writers that has a pow-

erful spelling checker and the-

saurus. Not copy protected.

CIRCLE 428 ON READER SERVICE CAL margin justifying. Included with New World Writer are guides to word usage and hints on word processing applications. Speed word-frequency and word-counting pro-

The spelling checker requires the file to be saved before checking, and if the first two letters of a misspelled word are transposed, the program is often unable to offer an alternative.

grams are built in.

Easy 1.5 Adds **Mailing Lists**

HANDS ON

BY BILL HOWARD

Two segments of the word processing market should be delighted with the latest version of MicroPro's Easy: people who need a ready-to-go, idiot-proof mailing-list/mail-merge option, and those users who need to plug the results of any Lotus spreadsheet in the middle of a letter or proposal.

Easy came out last fall as a \$149.95 competitor to PFS:Write in the personal word processor arena for casual users. If Easy lacked the elegant simplicity of PFS:Write, it offered a few more features and the ability to work with documents created with WordStar.

MicroPro's aging warhorse. Version 1.5 brings a bit more

speed, a bigger spelling checker (87,000 words instead of 65,000), and more printer support in its two versions: Easy (now \$99) and Easy Extra (\$149.95), which adds the EasyMail list manager and mailing-list program to Easy.

EasyMail is a simple database with 23 predefined fields (you can't create any of your own, but the ones you need are probably included), adequate sort and report capabilities, and the ability to print directly to commonly used mailing labels and business envelopes. No one will mistake EasyMail for abase ni Prus, but it takes only 10 minutes to learn and three keys (Esc, F1, and F2) to use.

(continued on page 38)

Easy's Nice, but Where's WordStar 4.0?

SAN RAFAEL, Calif.-In the midst of reports of a declining market share, Micro-Pro International Corp. has mobilized "a very large development team" for the next upgrade of WordStar. the program that put Micro-Pro on the map.

The last major WordStar upgrade, from Version 3.24 to 3.30, was a lifetime ago-as computer programs go-in April 1983. That may be a record for a major program to endure without enhancements.

"Look for a new Word-Star-Version 4.0-by year's end," says Lee Lensky, MicroPro public relations manager. "The intent is not to catch up but to go ahead-to enhance the product and still have it be WordStar, recognizable to

The WordStar trademark dot and block commands will remain. Lensky says. WordStar, Version 4.0. might contain a version of the Word Finder thesaurus: also, better on-screen formatting and an undelete command are probable.

Lensky says reports of WordStar's demise are promoted by competitors "who want to see the product die." "But," says dealer John

Williams of Software Specialists, in Washington, D.C., "MicroPro's retail penetration by local reps is abysmal. MicroPro might have a good product, but it will never get its due because of poor marketing techniques. They've gotten inzy in their market-ing." -Charles Bermant

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Microsoft C Compiler 4.0 Adds Full-Screen Debugger

HANDS ON

BY CHARLES PETZOLD Weighing in with seven disks and three manuals containing 1,400 pages of documentation. Microsoft Corp.'s new C Compiler, Version 4.0, continues the high standards set by the previous Version 3.0.

The new version offers improved optimization and better recovery from cascading errors. In addition to the small, medium, and large memory models, Version 4.0 adds the "compact" model (which allows 64K bytes of code and multiple data segments) and the "huge" data type (which allows arrays to ex-

ceed the 64K limit). The extensive collection of library functions has been expanded for greater compatibility with UNIX System V and the emerging ANSI C standard (and to provide two versions of a header file when these two standards conflict). Additional memory allocation functions manage the huge data type.

Functions to convert between Microsoft BASIC floating-point format and the IEEE format used in the C Compiler allow C programs to easily access data files created in BASIC containing floating-point numbers. Source code for the startup prologue is included for

Until now, the Microsoft Windows Software Development Kit has included an update to the C Compiler for programming Windows applications. This new C Compiler supersedes that interim release and also includes updated libraries for Windows applications. However, Windows program-



Microsoft C Compiler, Version 4.0 Microsoft Corp. 16011 NE 36th Way Box 97017

Redmand, WA 98073 (206) 882-8080 List Price: \$450 (\$150 for update from any Microsoft. 1BM, or Lattice C compileon

Requires: 260K available RAM, (IBM PC compatible required for CodeView in fullacreson marchardisk driver (band disk recommended).

DOS 2 0 or later In Short: A new full-screen symbolic debugger, called CodeView, leads the enhancements. Not copy protected. CIRCLE 422 ON READER SERVICE CARD



The new CodeView debugger displays C source code and compiled assembly languag with rembolic names (including local variables) substituted for memory addresses

Easy 1.5

The EasyMail data files can be merged into Easy form letters the same way WordStar does with MailMerge

Ever start writing a budget Development Kit for some utiliproposal and remember you wanted to drop in some figures you created with 1-2-3 or Symphony? As with most word processors, you can insert another file into the one on which you're working. Easy goes one step to Version 4.0 is a new fullfurther and recognizes any file with the extension . WKS or WK1 as a Lotus spreadsheet; you can insert the whole file or a named range

As in the previous version, Easy works with only three keys: F1 (help), F2 (two alternating editing menus), and Esc (to back out of anything you didn't intend). That's easier for casual and first-time users, but a drawback once you're trying to

build up speed. Printer features such as double-width or near-letter-quality dot matrix characters can be used with the editing menu.

Easy, Version 1.5, could use the Chrysler advertising line: "The competition's good-we had to be better." Except in Easy's case, it's a crowded marketplace with old reliables getting stronger and talented young upstarts looking for action.

CodeView opens up to four windows, the first of which shows a command-line interface much like SYMDEB's. The "register" window lets you see all registers and flags, and a "watch" window lets you observe variables or expressions written with C syntax. The fourth window shows

ty programs, header files, the

LINK4 linker, and the reference

The most significant addition

screen debugger, called Code-

View. If SYMDEB (included

with the Microsoft Macro As-

sembler) is a symbolic debugger

with a superset of DEBUG com-

mands, CodeView is like a full-

screen SYMDEB with several

use a second monitor and can

work in the EGA's 43-line

mode. On a single-monitor sys-

tem, it can switch between your

program output and the Code-

View display by swapping

screen buffers or switching

The CodeView screen can

Full-Screen Debugger

documentation.

added features

your source code, either by itself or in a combined assembly language and source code display. The assembly language listing identifies all functions and variable names and even local variables-information that is normally lost when a program is compiled.

Command-Line Options

To do this magic, commandline options on the compilation and link steps cause all line number, function, and variable information to be embedded in the .OBJ and .EXE files, Although the full features of Code-View can thus be used only with output from the C Compiler, Version 4.0, Microsoft will also be upgrading its other language products to take advantage of



Fasy 1.5 Easy Extra, Version 1.5 MicroPro International Corp 33 San Pablo Ave San Rafael, CA 94903 (415) 499-1200

List Price: Easy 1.5, \$99; Easy Extra, \$149.95; upgrade from Easy, Version 1.0, \$10, and upgrade to Easy Extra, \$79 (free and \$35, respectively, through Sept. 30)

In Short: Version 1.5 adds an easy-to-use mailing-list manager and the ability to import 1-2-3 files to a worthy word processor. Not copy protected.

Code View.

Interoffice Memo.

A single MaynStream backs up all the PCs in your office, file by file!



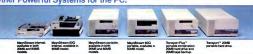
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SmartNotes is one of those utilities that like The Norton Utilities. ProKey, or Sidekick, finds its way onto seriously used personal computers."

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■ NEW ON THE MARKET ■ PAUL M. STAFFORD

PC Convertible Add-Ons Expand RAM, Disk Storage Capabilities

As aftermarket products for IBM's \$1,995 PC Convertible are beginning to trickle onto the market, two companies announced products that enhance the Convertible's usefulness both as a desktop and a portable

machine STB Systems' \$450 C-Ram 384 is a single 384K-byte CMOS RAM card for the PC Convertible that brings the unit up to a full 640K RAM. IBM offers the PC Convertible with 256K standard, with two slots for IBM's \$195 128K cards.

which totals only 512K. Alloy Computer Products' \$1,995 Starbase II is an add-on subsystem that connects a 51/2-

Lotus Invades Micro-Mainframe Market: The Application Connection Lotus Development Corp.

broadened its horizons with a series of software packages designed to enhance data sharing between PCs and mainframe The Application Connection (TAC) line is PC and mainframe

software that connects statistical packages and so-called "fourth-generation" databases on IBM 370, IBM 43xx, and IBM 30xx mainframes running the VM and MVS operating systems with PC-based spreadsheet and database applications. On the mainframe end, VM/TAC (\$10,000) or MVS/TAC (\$13,000) interfaces with PC/TAC (\$180) to transfer and translate data from one side into data usable by the other. Also available are separate modules that translate specific mainframe applications formats. such as RAMIS II and NO-MAD2

List Price: VM/TAC, \$10,000; MVS/TAC. \$13,000: PC/TAC. \$180

Requires: 192K RAM, Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; (617) 577-8500

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inch floppy disk drive, a 20megabyte hard disk, and a parallel port to the PC Convertible. The \$2,495 Starbase III adds a 40-megabyte tape-backup unit into the equation.

List Price: C-Ram 384, \$450. STB Systems Inc., 601 N. Glennville, #125. Richardson, TX 75081: (214) 234-8750.

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HOT PROSPECT

Software Publishing, Software Products Int'l Introduce Integrated Packages

Two companies' integrated software nackages offer extensive features to new categories of users.

Software Publishing Corp., in its first new product announcement since Harvard Presentation Graphics has released PFS:First Choice, an entry-level package that includes word processing (with a spelling checker), spreadsheet, database, and communications modules for \$1.49

In a related announcement. Software Publishing introduced the PFS:Professignal Series. The new series will replace the old PFS line (which, incidentally, is still available for now) and will include PFS:Professional File (\$249). PFS:Write (\$199), and PFS:Plan (\$249).

Software Products International's \$595 Open Access II integrates six modules: a relational database, a spreadsheet fully integrated with 3-D graphics, word processing, communications, and a full set of desktop utilities, including a Rolodex file with auto-dialer, calculator, calendar, and appointment schedule. List Price: PFS:First Choice. \$149: PFS:Professional File.

\$249: PFS:Write: \$199: PFS:Plan, \$249 Requires: PFS:First Choice and Professional File, 256K RAM: Professional Plan, 384K RAM; Professional Write, 320K RAM. Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94043; (415) 962-

8910. CISCUL AND ON BEADER SERVICE CARS List Price: Open Access II. \$595. Requires: 256K RAM, Software Products International, 10240 Sorrento Valley Rd., San

Diego, CA 92121; (619) 450-ORCLE 400 ON READER SERVICE CARD



1576

Software Publishing Co.'s First Choice is a \$149 integrated software package that features word processing, database, spreadsheet, and communications modules.



STB Systems' \$450 C-RAM 384 adds in to the IBM Convertible PC to give it a total of 640K butes of RAM.

List Price: Starbase II. \$1,995: Starbase III, \$2,495, Alloy Computer Products Inc., 100 Pennsylvania Ave., Framingham, MA 01701: (617) 875-6100.

CIRCLE 433 ON BEADER SERVICE CARD

IBM Debuts Non-EMS-Compatible Extended RAM Card. 2.400-bos Modems

IBM's answer to the problem of adding extended memory to ATs has finally arrived. It's called the .5 to 3 MB Memory Expansion Adapter (MEA), and it costs \$595 with \$12K bytes of RAM (\$165 apiece for additional 512K modules). The MEA is not compatible with the Lo-

Toshiba Offers Low-Priced 24-Pin Dot Matrix Printer: Epson Ships 9-Pin. 24-Pin Units

Two major players in the dot matrix printer market have upgraded their offerings.

Toshiba America's \$999 P341e is a 24-pin, 136-column printer that operates at claimed print speeds of 216 characters per second in draft mode and 72 cps in correspondence-quality mode. The P341c has a parallel/serial interface and uses both bidirectional-tractor and singlesheet-feed mechanisms

Epson America continues its assault on the market with two 136-column units: the 9-pin \$995 EX-1000 and the 24-pin \$1,595 LQ-2500. Epson claims print speeds of 300 cps in draft mode and 60 cps in near-letterquality mode for the EX-1000.

tus/Intel/Microsoft expanded memory specification, but it is TopView, Version 1.1, compatible; the card's memory can also be used to backfill conventional RAM up to DOS's 640K limit.

Also new and True Blue are two 2,400-bit-per-second modems: the internal Model 4829 (\$569) and the external Model 5842 (\$719). Both devices are compatible with the Hayes "AT" command set and with IBM's proprietary command set. Both also use adaptive lineequalization techniques that reduce data-reception errors by automatically compensating for line-quality fluctuations. List Price: .5 to 3 MB Memory Expansion Adapter, \$595; 512K add-on modules, \$165; Model

4829, \$569; Model 5842, \$719. Call or write your local IBM representative. CIRCLE 445 ON READER SERVICE CARD

Vericomp. Boca Research Debut Low-Cost LIM

Expanded Memory Cards Two companies have debuted inexpensive expanded RAM cards that adhere to the Lotus/Intel/Microsoft expanded memory speci-

and speeds of 324 cps in draft

mode and 108 cps in NLQ mode

for the LO-2500. Both printers

feature 8K-byte buffers and

front-panel controls, which

eliminate the need for DIP

List Price: P341c, \$999. Toshiba

America Inc., Information Systems

switches.

fication (EMS). Neither contains I/O ports or can "backfill" RAM up to 640K

Vericomp's Breakthru/PC costs \$150 with 0K bytes of RAM and \$398 with a full 2 megabytes on-board. Vericomp claims that its card bank switch. es 15 percent faster than Intel's Above Board and over 25 per-

cent faster than AST's RAM-Boca Research sells its BO-CARAM to dealers only with 0K bytes of RAM for \$198 and to the public for \$245 with 256K bytes. \$395 with 1 megabyte, and \$740 with 2 megabytes, RAMdisk software provided with the card permits warm booting without loss of contents.

List Price: Breakthra/PC with 0K hytes of RAM, \$150; with 2 megabytes, \$398. Vericomp, 8825 Aero Dr., #210, San Diego, CA 92123; (619) 227-0400.

CIRCLE 440 ON READER SERVICE CARD List Price: BOCARAM with 0K RAM, \$198; with 256K, \$245; with I megabyte \$395; with 2 megabytes, \$740. Boca Research Inc., 6401 Congress Ave., Boca. Raton, FL 33431: (305) 997-6227.

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Turhiba America's \$999 P341e is a 136-column, 24-pin dot matrix printer that Taskiba claims will print 216 characters per served in droft made and 72 cps in NLQ mode.

Div., 2441 Michelle Dr., Tustin.

CA 92680; (714) 730-5000. CIRCLE 435 ON READER SERVICE CARD

List Price: EX-1000, \$995; LO-2500, \$1,595. Epson America Inc., 2780 Lomita Blvd., Torrance, CA 90505: (800) 421-5426 (outside Calif.); (213) 539-9140.

CIRCLE 436 ON READER SERVICE CARD

Enson America's \$1.595 LO-2500 is a 136-column, 24-pin dot matrix printer that operates at claimed print speeds of 324 characters per second in draft mode and 108 cm in NLO mode.

Hewlett-Packard Eight-Pen Plotter Designed for Low-

End CAD Market Hewlett-Packard Co. has unveiled its \$5,400 HP Draftpro, an eight-pen plotter that accepts up to D-size (640- by 1,000-millimeter) paper. The unit features automatic pen-changing and capping, and HP claims 15-inch-persecond pen speed, .001-inch addressable resolution, and .2 percent linear accuracy. The HP Draftpro also features pen sorting, which lets it draw a full buffer of vectors in one color before drawing the next.

List Price: HP Draftpro, \$5,400. Hewlen-Packard Co., 3000 Hanover St., Palo Alto, CA 94304; call the Hewlett-Packard sales office listed in your white pages. CIRCLE 434 ON READER SERVICE CARD

Hewlett-Packard's \$5,400 HP Draftpro is an eight-pen plotter capable of 15inch-per-second pen speed. .001-inch addressable resolution, and 2 percent linear accuracy.

LANs: Univation, 3Com, Debut Network Systems Based on IBM Token Ring

As the networking market heats up, two makers have introduced local area network products that link to IBM's Token Ring Network.

Univation's LANscape network is an Ethernet-based system that uses Novell's Advanced NetWare 2.0 operating system and can emulate IBM's NETBIOS standard. The system is centered on the \$5,495 FS 2000 File Server, which features a 10-MHz processor and up to 1,200 megabytes of mass storage, and can support up to 100 workstations through the \$595 NC 516 Network Interface Card.

3Com Corp. offers a series of Token Ring-compatible products, all based around the company's popular 3Server (\$8,995).

The TokenLink Plus adapter card sells for \$1,095; the Token Connection for the 3Server is \$1,295. RingTap (\$95) and TokenPlus (of various lengths; starting at \$50 for 5-meter lengths) provide a cabling solution based on the Token Ring and Ethernet standards. List Price: FS 2000 File Server. \$5,495; NC 516 Network Interface Card, \$595, Univation, 1231 California Circle, Milpitas, CA 95035; (408) 263-1200.

CIRCLE 442 ON READER SERVICE CARD List Price: Tokenl ink Plus. \$1,095; Token Connection, \$1,295; RingTap, \$95; TokenPlus, starting at \$50. 3Com Corp., 1365 Shorebird Way, Mountain View,

CA 94039; (415) 961-9602. CIRCLE 443 ON READER SERVICE CARD

Univation's \$5,495 FS 2000 File Server is the center of its LAN scape network, which uses Novell's Advanced NetWare 2.0 operation system and can emu IBM' & NETRIOS Token Ring standard.



Adaptec Controller Boosts Hard Disk Capacity by 50%





BY WINN L. ROSCH The cost of hard disk storage may take another big drop, but this time it's the result of American ingenuity rather than Asian factory efficiency. Previous hard disk price decreases were directly attributable to the influx of cheap hardware from the Far East, but a new PC-compatible hard disk controller from Adaptec of Milpitas, Calif., will let users squeeze 50 percent more data onto many existing hard

disks

Increases Storage With the Adaptec ACB-2070A Hard Disk Controller. the mass storage capacity of many systems can be boosted as easily as plugging in the new card-for instance, a 20-megabyte drive can be stretched to 30 megabytes.

The secret of the Adaptec ACB-2070A is that it uses 2.7 RLL (Run Length Limited) data coding, while nearly all other PC hard disk controllers use MFM (modified frequency modulation). The essence of

this difference is the pattern of magnetic transitions that actually store data on the disk: 2.7 RLL requires 50 percent transitions (which means 50 percent less disk space) to encode the

same amount of data as MFM. **Boost Transfer Speed**

Another benefit of the new ACB-2070A controller is speed. The 2,7 RLL coding increases the data transfer rate of the disk subsystem from 5 MHz to 7.5 MHz. In addition, the ACB-2070A controller uses a sector interleave factor of 3 (versus the XT's 6), which also

quickens data transfer. Even if you're not experienced in programming, you can adapt the ACB-2070A to your system. The necessary disk formatting and system configuring software is recorded in ROM on the controller, and it can be put to work using DOS's DEBUG.

Easy Installation

The controller is so PC compatible that you could slide the ACB-2070A into any fulllength slot in your XT and, with no more than a few minutes' tinkering, add 50 percent to the capacity of your hard disk-except the ACB-2070A controller won't work with IBM factoryinstalled hard disks. The disks are not capable of meeting the rigorous demands made by the 2.7 RLL coding.

"Not too many drives currently support RLL," notes A. Edward Turner, Adaptec director of marketing, "It takes better media and a better read/write channel."

However, if you've bought

Adaptec ACB-2070A

Hard Disk Controller Adunted Inc. 580 Cottonwood Dr.

Milnitas, CA 95035 (408) 946-8600 List Price: \$154 Requires: PC, XT, or cor

ble; RLL-compatible hard disk drive: DOS 2.0 or later In Short: A hard disk controller on a full-length expansion card that uses 2.7 RLL coding to squeeze 50 percent more dat onto disks and achieve higher data transfer speeds. CRCLE 427 ON READER SERVICE CARD

one of the more recent drives that will support 2,7 RLL, you can boost your disk capacity with the \$154 addition.

Although the current ACB-2070A controller works with only PCs, XTs, and some compatibles, Turner promises, 'We're working on one for the AT, too. It may cost a little more than the XT version, but not much."

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Allows for single sheet; with documents contain

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SUN. & FRI. 9:00 AM-4:00 PM

■ PC UPDATE ■ CHARLES BERMANT AND DAVID GRAY

Pressured by the success of low-cost PC compatibles, IBM Corp. cut the prices of its flormy-disk-drive PCs by \$400 on August 1. A 256K-byte PC with two 360K-byte floppy disk drives was cut 20 percent to \$1,595; the one-disk-drive PC was cut 22 percent, to \$1,445. A 64K no-drive PC was reduced \$225, or 16 percent, from \$1,390 to \$1,165. Prices on PC ATs and PC-XTs were unchanged. It was the second price cut of 1986 for IBM. On April 2, prices of PCs, XTs, and ATs were cut by as much as 26 percent, including \$150 and \$300 on one- and two-floppy-disk PCs, respectively.

Want to buy an IBM PC Convertible? Don't plan to check in with the office by electronic mail if you do. While the \$1,995 lanton was introduced April 2, the \$450 1,200-bit-per-second modern option won't be available until the fourth quarter, IBM says. How's the PC Convertible doing otherwise? The demand is greater than expected,

IBM says; some customers may have to wait as long as 5 months.



he says. "It's comine in bits and pieces. It's not selling like hotcakes, but it may be constrained hy lack of availability. The salespeople can't get the units, so they might not be pushing them.

Others are more blunt: "We've had very few requests for the IBM Convertible," says Mike Collins, sales manager for ComputerLand in Lubhock, Tex. "The laptop doing the best is the Toshiba T1100 Plus; it's faster and less expensive than the IBM. There has been little or no interest in the Convertible.

Lotus Development Corp. released I-2-3, Release 2.01. The upgrade, characterized as a maintenance release, corrects incompatibility problems with label treatment between Release 2 and worksheets made with Release IA. Previously, the use of dashes for 0s in labels in a Release 1A worksheet template resulted in error messages with Release 2.0. With Release 2.01, dashes used in a mixed formula reference now are treated as 0s. In addition, Release 2.01 speeds up the file retrieval time and provides for simpler installation. The program remains copy protected. Upgrades from Release For LA are \$150; upgrades from Release 2 are \$15. Without an upgrade, the program remains \$495.

The Consortium, a Los Angeles-based group, has been formed with the purpose of consolidating the 1-2-3 aftermarket. Aimed at the estimated 3 million users of 1-2-3, it will provide a number of services for both buyers and sellers of these add-on products. The company will be generating monthly State of the Aftermarket press releases and will conduct free seminars and user group presentations nationwide. A booklet that lists many aftermarket vendors is available from The Consortium at 10644 Eastborne Ave., #202, Los Angeles, CA 90024; (213) 470-8644.

The National Data Corp. has introduced a PC version of Probe, its decision support system. In its mainframe form, Probe has been used for market and sales forecasting and economic analysis in several large corporations. The PC version has incorporated program-

mine and modeling modules with the ability to create statistical models. It's available for \$1,600 from National Data Corp., Corporate Sq., Atlanta, GA 30329; (404) 329-8500.

Generic Software has added AutoDimension, an automatic dimensioning module, to its \$99.95 Generic CADD package, AutoDimension adds dimensions and legends to computer-generated drawines. It can be ordered for \$49.95 from Generic Software Inc... 8763

148th Ave. NE, Redmond, WA 98052; (206) 885-5307.

St., Portland, OR 97230; (503) 256-0130.

MBBS Software has released Version 3.1 of Merge nº Print, a product that gives word processors easy access to database files for the preparation of personal form letters and related functions. The program serves as a mail-merge bridge, eliminates most file-conversion incompatibilities, and supports print-formatting commands. The cost is \$100 from MBS Software, 12729 NE Hassalo

Direc-Tree, a hard disk file-management program, has been upgraded to Version 5.0. Copy protection has been removed from the program, which is now called Direc-Tree Plus. In addition, short notes on file directories can be implemented, and subdirectories can be hidden and accessed only through a password. You can purchase it for \$49.50 from Micro-Z Co., P.O. Box 2426, Rolling Hills, CA 90274; (213) 377-1640.

GOLDATAbase, a database management program, has been reduced in price to \$124.95 from \$595. In addition, a 20 percent discount is being offered through October 1, bringing the cost of the nackage down to around \$100. Contact: Goldata Commuter Services, 2 Bryn Mawr Ave., Bryn Mawr, PA 19180; (215) 525-1036.

Borland International upgraded Turbo Tutor to Version 2.0; the price increases by \$5, to \$39.95, with upgrades available for \$10; Borland also introduced an enhanced version of Turbo Lightning, now called Version 1.02A; the upgraded program retains the \$99.95 price and now supports possessives and the dBASE III and Enable environments. Users who want to upgrade to 1.02A must return their disk to Borland and pay \$15.

Autodesk has enhanced AutoCAD to Version 2.5. Added features include such new editing commands as Stretch Trim, Rotate, Scale,

and Explode; faster pan and zoom operations; support for Lotus/Intel/Microsoft expanded memory or PC AT extended memory; and a hardware-based copy-protection scheme. Also released were Auto CAD AEC Architectural, Version 2.5-an architec-

tural design and



AutoCad 2.5 has expanded men

drafting package for use with AutoCAD (it lists for \$1,000, with free upgrades for AutoCAD AEC users)-and a \$2,750 version of Auto-CAD, Version 2.5, for the IBM RT PC. The normal Version 2.5 also lists for \$2,750, with upgrades available for the difference in retail price between it and previous versions.

Referee Blows the Whistle on Memory-Resident Programs



PC HANDS ON

BY WINN L. ROSCH Your PC won't explode if you try to cram too many resident programs into its limited RAM. but you just might. All too soon you'll end up playing 'hot key" roulette, never knowing what program will pop on the screen with each key press, and your favorite applications will shrivel and die from the lack of

RAM to roam in. Earlier this year, PopDrop (\$19.95) from InfoStructures of Tucson, Ariz., made managing resident utilities easier by letting you slide the programs out of memory when you no longer need them (see PC News, page 46, "PopDrop Removes Resident Programs from PC Memory," PC Magazine, Volume 5 Number 11). Now Persoft's Referee takes memory-resident program management one step further: it lets you eliminate RAM-resident software or just temporarily disable individual resident programs to keep them out of the way and then reactivate them when you need them.

Refwatch Memory Monitor

To bring Referee onto the field, you load Refwatch, a RAM-resident (requires 25K bytes) memory monitor, which tracks each change of the host system's interrupt vectors and memory assignments. Once Refwatch is in place, you can

load your other memory-resident programs. You have two options for handling resident programs: Referce, a disk-loaded utility. or Sideline, a pop-up memoryresident version (which requires 15K bytes, plus an additional 12K if you want it to pop up

over graphics screens). Both are menu oriented and easy to use. Both programs let you peel other RAM-resident programs from memory one layer at a time-the last to be loaded must be the first to go. You can also suspend the operation of any or all of the programs that are resident-in any order-without unloading them from memory, so that pressing hot keys won't pop up the programs. Both Sideline and Referee also moni-

tor memory usage and tell you which programs are resident at any given time.

Go the Extra Mile Referee goes even further,

allowing you to designate particular resident utilities to function with particular programs. Then, when the designated program runs, only those resident utilities associated with it will be automatically activated. while the rest are put on hold.

This technique has its shortcomings. When Referee suspends a resident program, the program does not drop from memory but waits to be recalled. Your RAM is left crammed even though the space-hogging resident programs aren't doing anything for you. Fortunately, Referee also has a command mode, which allows you to use it in batch files and throw resident programs

completely out of memory. Within its limitations (and those of DOS), Referee gives you more control over resident software than any other product currently available.



Referee Persoft Inc 465 Science Dr Madison, W153711-9380 (608) 273-6000

List Price; \$69.95 Requires: 64K RAM for main program, one disk drive, DOS 2.0 or later

In Short: A memory manager that can either remove RAMresident programs from memory or temporarily disable unused programs (without unloading them) to prevent "hot key" conflicts. Not copy protected. CIRCLE 422 ON READER SERVICE CA

V-EMM: Virtual Disk for EMS Memory



BY WINN L. ROSCH Mainframe computers have long used the technique of virtual memory to make cheap disk memory act like expensive RAM. Virtual Expanded Memory Manager (V-EMM) by

Fort's Software brings this capability to personal computers. This \$89.95 program turns up to 8 megabytes of hard disk storage into virtual RAM accessible by programs that run under the Lotus/Intel/Microsoft exnanded memory specification (FMS) Using V-FMM bytes are written to disk rather than to RAM chips and are recalled as needed In addition, V-EMM lets extended memory work as expanded memory on PC ATs

and compatibles V-FMM can be installed only when you need it-for instance, when working with a massive 1-2-3, Release 2, spreadsheet that won't fit in normal memory. The penalty is speed-RAM is much faster than hard disks.

Extending AT Memory V-EMM can redirect 80286

protected mode (extended memory) to the Lotus/Intel/Microsoft expanded memory specification so that PC ATs can actually use memory in excess of the foldk bytes of RAM recognized by DOS. While many of EMS programs are available, most notably 1-2-3. there's little use for extended memory beyond RAMdisks. On systems without F.MS. V-EMM installs as a system driver in the CONFIG.SYS file of the host. In all cases, special programs are used to install, deinstall, and activate the V-EMM memory. V-EMM reserves the disk space for EMS emulation by writing a hidden, read-only file in the root directory, invisibly trimming disk capacity.

On systems that already have some EMS memory (for instance, with an Intel Above Board), V-EMM takes no space from DOS memory. PCs without EMS give up 64K bytes of DOS memory to use V-EMM: ATs require 72K, V-EMM is almost entirely compatible with EMS, except that it cannot handle function calls that directly access EMS handware. Most programs do not use these calls, and their use is discouraged in

EMS programming guides.



FACT

Virtual Expanded Memory Manager (V-EMM), Version 2.0 Fort's Software P.O Box 396 Manhattan, KS 66502 (913) 537-2897 List Price: \$89.95 Requires: 128K RAM, EMS board with 256K EMS memory (or 64K to 72K additional memone without an EMS board). DOS 2.0 or later. In Short: A software product that uses hard disk memory or 80286 protected mode (extended

memory) to emulate up to 8 megabytes of Lotus/Intel Microsoft EMS RAM Not copy protected. CIRCLE 421 ON READER SERVICE CAR

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- sets the mouse to your predefined setting ■ POINT-AND-CLICK SHELL for Lotus 1-2-3: the only mouse interface for 1-2-3 that goes beyond keyboard emulation. With context sensitive pop-up menus and an independent mouse
- cursor that changes shape and meaning in different areas of the 1-2-3 screen. Makes it faster and easier to select a cell, invoke a command or scroll. ■ POINT EDITOR: a mouse based program editor featuring
- pop-up menus and overlapping, color windows for faster, easier file editing. Use it instead of EDLIN or any other ASCII file aditor

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■ COMMUNIQUES ■ EDITED BY BILL HOWARD



For the PC owner who has everything (but taste): computer "Furn-ipherals." The PC Beast is \$14.95 from Fundamental Design Group, 154 Magazine St. Cambridge: MA 02139: 16171876-4141.

Trick of the Month

"OfficeLink/WordStar converts WordStar documents to Word-Star and vice versa while maintaining complete document in-

tegrity."

Office Solutions press release

But Does It Convert WordStar Files?

"URGENT! CORRECTION TO PRESS ANNOUNCEMENT

"The following announcement was issued on June 13. 1986, and is subject to these corrections:

"—There was an error in the capitalization of MicroPro.

"—The closing quotation mark was one space to the right. "Attached is a correct ver-

ion."

—Borkend International press release

Best New Names

Amnesia Board, a \$99 PC (\$129 for ATs) expanded memory board from Xebec of Carson City, Nev. Why do they call it Amnesia Board? It comes with

no memory.

RapSheet, a small shareware spreadsheet written by Bill Grimm for blind PC users. It works with several voice synthesizers now on the market. (\$35 suggested donation for IBM or Apple versions; Bill Grimm, P.O. Box 10367, Fort

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grous claims? Send them to Communi-

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qués, PC Magazine, I Park Avenue, New

York, NY 10016; (212) 503-5293 or MCI Mail 157-9301. We'll send you a PC

Wayne, IN 46852.)

Jose, This Is Philodendron— Do You Read Me? Jose Sanchez, a Long Beach, Calif., engineer, is using a per-

sonal computer to "accumulate data related to the generally accepted observation that there exists some form of telepathic perception, by plants, of human beings."

Sanchez says a houseplant hooked to his computer emits electrical impulses when he enters the room. With the aid of a 30K-byte program that converts the impulses to random words, the plant produces free-form verse.

War Games

Nisan Ebel, of Israel Aircraft Industries, was quoted in *The New York Times* on the Lavi (Hebrew for *lion*) fighter plane that Israel wants to build instead of buying American F-16s:

"The F-16 is a Commodore 64. The Lavi is an IBM PC with 500,000 bytes and a hard disk."



Tandy Expands Line of Low-Cost PCs, ATs

BY PAUL M. STAFFORD

NEW YORK—Tandy Corp.'s introduction of four new PCcompatible machines marks an attempt on the part of the Texabased electronic glain to solidiy its had on the DOS-at-bome to the part of the Texabased electronic glain to solidiy its had on the DOS-at-bome to the part of the Texaplace. It also shows Tandy's willingness to battle both IBM and the no-name mail-order clone manufacturers simultaneously on the basis of price.

Two of the models—the \$799 1000 EX and the \$1,199 1000 SX—will fit nicely into the home niche created by businesspersons who work at home and by students. Increased acceptance of these machines has been made more likely by the discontinuation of the 5999 Tandy 1000, which has so far been the main contender in that field.

The EX is primarily an edu-

cational machine, with 256K bytes of RAM, one 5½-inch disk drive, and space for three proprietary expansion cards. It is a one-piece unit that more closely resembles the Commodure 54 than it does the 1BM PC. The 1000 SX looks just like the discontinued 1000, but runs at dual speeds of 4.77 and 7.16

MHz. Both 1000 models come with Desk Mate II integrated software.

A pair of 80286 machines rounds out Tandy's contribution to the business end of the market. The \$1,699 3000 HL muss at both 4.77- and 8-MHz clock speeds. It comes standard with 512K bytes of RAM (expandable to 640K), one 360K florpy disk drive, and seven expansion slots (four 8-bit and three 16-bit). The \$4,299 3000 HD is a version with a 40-megabyte hard disk drive.

Compete on Price The three machines that are

really new have a chance to make a strong impact on the market. Both the 1000 EX and the 1000 SX compete aggressively with others in their class: the Leading Edge Model D retails for \$1,295 with \$12K bytes

of RAM, two floppy disk drives, and a monochrome monitor; the Epson Equity II sells for \$1,695 without a monitor but has a dual-speed (4.77and 7.16-MHz) CPU. A 256K, two-floppy IBM PC is \$1,595.

The 3000 HL competes directly with mail-order AT compatibles such as the \$1,495 PC's Limited AT. And all the Tandy machines have the advantage of being part of the country's largest computer-dealer network.



Ilbatration, Warren Gebert Photograph: (PC Seato Thom O'C



the four large pictures you see above (up to 2 by 4 inches on an IBM or Epson printer). We photo-reduced the rest to show you more of this incredible collection.

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Europe Measurbrone Cropton	Yes			Ves	Yes	
172 Estada Dropter	Wes.			41	No	
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dBMAN	395		MicroSoft Chart	295	199	Turbo Lightning	100	59	MicroSoft C 4 0	450	319
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Knowledgeman 1 07	495		Norton Utilities	100		AST 6 Pack Premium	595	399		150	105
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R BASE 5000	695		Relay Gold	249		Televideo AT w 20M		2695	Novell Proteon (2 user)		2999
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Cell/Mate Locks Out Errors From Lotus Spreadsheets



Have you ever wanted to check your own spreadsheets for inconsistencies and possible errors? Or received a hand-medown worksheet and wanted to find out how the numbers were derived? Or wanted to give your boss not only a spreadsheet but a logical English-version explanation of where those numbers come from? There's a new important program from Clarity Software Corp. that does all this and more. Called Cell/Mote. it works with spreadsheets produced by all versions of both

1-2-3 and Symphony. There's a good reason for the existence of Cell/Mote: Lotus spreadsheet errors. Not only ERRs. @NAs. and circular references but also the less-obvious and more-insidious types such as formula references to empty cells, totals with reversed range coordinates, cells not referenced containing constants. and so forth. Cell/Mate's "reports" examination mode identifies these types of trouble spots so that you can correct them. This lets you check a spreadsheet for errors before acting on its results.

Examination Modes

Cell/More has three other examination modes: document. analyze, and where-used. All three work on either a single cell, a row or column, a named range, or an entire worksheet-depending on your specifications. The document inquiry can produce an Englishsentence version of a formula or series of formulas such as Entertainment [Jan] = 0.05 *TOTAL INCOME [Feb]. Or you can toggle a formula version of the same cell. In this fashion, you can document the logic behind an entire worksheet or model. The analyze mode takes



Clarity Software Corp.'s \$89 Cell/Mate is a 1-2-3 utility that documents your spreadsheets and helas you track down possible errors and trouble spots.

things one step further. It first documents a cell and then analyzes each of the component parts to the right of the equal

sign (=). For the example used above, it would offer additional details in the following three equations:

FACT

Cell/Mate Clarity Software Corp. 13276 Research Blvd. Austin, TX 78750

(512) 331-5356 List Price: \$89 Requires: 256K RAM, DOS

In Short: A companion program for all 1-2-3 and Symphony versions that helps you docu-

ment models and check them for errors. Not copy protected.

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ysis from one to ten levels.

The where-used mode is the

Tornado Notes: Whirling Disparate Data into Line

BY CHRISTOPHER JOHNSTON

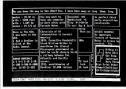
It flew in from New Jersey, whiring information into line: it's Tornodo Notes, a RAM-resident notepad utility that sections the monitor screen into myriads of overlapping windows. These can be filled with ideas, schedules, memos, time zones for cities around the world, or the price of eggs in Zimbabwe.

Ingenious Windowing The program writes all the

notes to a single DOS file; Tornado Notes's windowing function divides that file into portions that appear on the screen in separate windows. These act like a stack of notes on a desktop. You rummage note by note through the stack using the cursor keys; Home and End pop to the top and bottom of the stack. Otherwise, you can search for a note by content, using *Tornado Notes*'s string-search function.

A small command menu tags along wherever you go, and so the available options are always on-screen. Also, concise online help is an H key away.

Since Tornodo Notes can hold up to 28 notes at a time, it's fortunate that Micro Logic included a visually oriented string-search function, which



Micro Logic Corp.' a \$49.95 Tornado Notes is a nosepud utility that lets you manips

Cell/Mate

tion. It shows where a designated cell is used elsewhere in the spreadsheet. This can be extremely helpful for seeing which cells will be affected if a change (or an error) was made in the source cell.

User Interface

The user interface is not entirely intuitive to learn, but it's easy to use once you have some experience with the program. For the document, analyze, and where-used modes, Cell/Mate opens a utility window that shares the screen with your worksheet. If the utility window is too small for the information generated by your inquiry, you have the option of toggling into it and perusing the rest of the data. Or you can zoom into the utility window and display it full-screen. Cell/Mate also makes it easy to print out the information in the utility window.

To transcribe your spreadsheet formulas into English. Cell/Mate has you use the row and column headings to define the cells. There are other features that help you fine-tune the English version to be more descriptive of the cell contents, including column and row prefixes, suffixes, and repeating labels. Cell/Mate should work well with most, if not all, of your worksheets.

Aerial Views

Another snappy feature of Cell/Mate is that it produces an aerial view of your named ranges-including where they overlap. Cell/Mute also provides context-sensitive help

1-2-3 or Symphany users will feel right at home with Cell/ Mate's screens and command menu because they mimic 1-2-3 and Symphony menus. Don't expect to be able to learn as you go, though. You'll have to read the documentation or take the well-written tutorial before you know your way around Cell/ Mate. But the effort will be well worth the time because if spreadsheets are your forte, you won't mind being locked up with Cell/Mate.

Calendar Creator Creates Better Calendars

BY M. STEPHANIE RICKS

Calendar Creator is a handy nofrills utility. Unencumbered by fancy graphics and hefty documentation, Calendar Creatar lets you keen track of daily. monthly, and recurring events in a well-organized and accurate

It achieves this simple aim through the use of overlays-similar in concept to film transparencies-which allow you to incorporate, edit, or remove specific calendar groupings. Updating calendars is easy because the overlays are each handled individually.

1. Print Columbur

2. Create Overlas

3. E41t Overlay

convenient ontions: the wildcard and the floating event. The wildcard, or recurring-event, function, lets you mark recurring occasions like birthdays and anniversaries with an aster-

The floating-event function lets you set aside events that vary by date but occur in regular patterns such as the third Wednesday of each month or the first Sunday of each December. Using Calendar Creator's

wildcard and floating-event functions in tandem, you can create a calendar that marks off every Saturday in October 1986 CALDRAIR CREATES S. Save Overlay Group 6. Get Overlau Green 1. Eult

Channelmark Corp.'s \$39.95 Calendar Creator picks up where SideKick's calendar

Costinue

for this leaves off. Jetting you mountain a complicated events colendar.

E Exit to DOS

Tornado Notes

Help

displays a line of dots-one for each note. The string-search function eliminates notes that don't match the string criteria until finally only those notes with the typed string remain. When only one remains, the program moves immediately to that note.

Numerous Options

After halting on a note, you can print, edit, or delete it, or you can search for or create a new note. When you make a new note, you either specify window size and screen position or let the program fit a border to

the text. The editor is simple and includes word processing standard brand features such as cut and paste, insert and delete, word wrap, and date/time insertion. The print submenu has formatting, page/line advance, top of form, text formatting, and automatic form and line feed. There is a tailorable forms generator for making memo forms, billing statements, or any often-

used paging outline. Tornado Notes is an enhancement to SideKick-like utilities but is not a replacement. People who juggle so many ideas that they're considering running off to the circus should find Tornado Notes a significant productivity tool.



Calendar Creator Channelmark Corp 2929 Campus Dr. San Mateo, CA 94403 (800) 851-2916 (outside Calif.) (415) 345-5900 List Price: \$39,95 Requires: 128K RAM, comnatible graphics printer, DOS In Short: An easy-to-use program that maintains and updates a rigorous schedule simply and efficiently. Copy protected. CIRCLE \$32 ON READER SERVICE CAR

and 1987.

Calendar Creator is simp to use. The main menu is divided into six program functions, which allow you to create, edit. and remove overlays; print calendars; and save and get overlay

Calendar Creator does have some important limitations: It cannot spread a single event over the course of several days. so you must enter such events separately on each date. Also, when you ask the program to find events on a particular date. only the first event listed on that date is highlighted.

Overall, though, Calendar Creator offers timely, well-detailed, and easily updated calendars for personal and professional use.



Tornado Notes, Version 1,2 Micro Logic Com. P.O.Box 174 Hackensack, NJ 07602 (20t) 342-65t8 List Price: \$49.95

Requires: t28K RAM, DOS 2 Oor later In Short: RAM-resident multiple-window ootenad with a string-search function. Great for simultaneously managing notes, ideas, memos, and mis

cellaneous bits of information; a good sidekick to SideKick



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Data Zone's Hard Disk Card: Built for Speed

BY VINCENT PUGLIA

Data Zone's Slot-20 Turbonive compares, well with the bevy of hard disk drive/cards out there. It offers more utility and added features than many of its competitors at a comparable price. For \$1.195, you get a preformated 20-megabyte hard processor, a back install routine, a park program, and two Softlogie Solutions programs, Disk Optimizer and Double-DOS.

Single-Slot Hard Drive

The TurboDrive differs from other hard disk cards because it uses a half-length controller card. The inch-and-a-half-wide drive sits nearly flush against the card, there is only a slight space between the drive itself and the controller's chins. As a

result of this design, the controller can be slipped into the PC's or XT's first slot next to the power supply, with the drive hanging over into the empty



Data Zone's \$1,195 Slot-20 TurboDrive is a 20-megabyte hard disk on a card that fits into a single expansion slot and fratures a 32-second average access time. area behind the floppy drive.

Installation also requires that you connect an enclosed Y-adapter cable between the drive, the power supply, and one of the floppy drives. On an XT you'll have to remove the IBM hard disk controller card and run the XT drive off Data Zone's controller. Because the Data Zone drive consumes less than 10

watts, it has no trouble with the

standard PC 92-watt power sup-

ply. I tested the drive in a fully

populated IBM PC with no problems.

Fast Accelerator

The 8088-8 processor is rated at 8-MHz versus the standard PC 4.77-MHz. 8088 chip. Replacing your PC's 8088 CPU with the 8088-8 resulted in a 10 percent speed improvement in PC Magazine Labs benchmark tests. This, coupled with the 32-second average access time of the drive itself, creates a noticeable increase in your PC's working speed.

While the two bundled and



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two software packages, and a
park program. In Offers easy installation, hassle-free use, and
value. Copy protected.

grams, both of which are copy protected, are pretty good, they do not in themselves constitute a reason to buy the Slot-20 Turbo-Drive. The best reasons for liking this drive are speed, size, and value.

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While Remote itself becomes transparent in use, it offers some very tangible benefits:

. You don't need a second PC to do the job of two. Almost any terminal or terminal emulator will do. The only software you need is the software in your host PC.

- · Each of several different users can call in from anywhere in the world and use the host PC and software. Remote includes a sophisticated electronic mail system with encrypted messages
- and individual password protection. · You can transfer files to and from the host computer, using
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Progress report



Understanding new technology is like learning how to swim: you don't learn by watching; you have to jump into the deep end and get wet.

very once in a while, I practice what I preach. Several issues back, I exhorted you not to be too reliant on your old faithful hardware and software, to try out new products. You might be pleasantly surprised, said I. So I gave myself several doses of my own medicine.

My first story started a long time ago for the computer industry) and has a hapy ending. It started in Last Vegas, Nevada, November 1985, at Fall Condex. Executive editor Paul Somerson, publisher Bill Lobke, and I were previewing a new graphics program. The then-unnamed product did only one thing but did it extraordinarily well: three-dimensional graphics. One of the principals showed how it could display date in those sees, and or compressed. It had an incredible army of graphic styles and formusts and allowed complete existentization of its grands.

They finally shipped the product late in May, and I confess that I did the readers of PC Magazine a partial disservice. I let an issue or two slip by before I told you how great the product is.

It's called Perspective, and it is the best hing I've seen yet for graphically displaying complex information. I'm particularly close to that challenge because of the complex array of test results produced by PC Magazine Labs. When you're comparing products, sometimes you want to look at a product's performance across all the tests and other times you need to see how a product comparing the product comparing the product comparing the product comparing the product comparing test by test.

So when Perspective came in, technical art director Gerard Kunkel and I immediately put it to work designing the next genention of PC Labs benchmark test charts. Then I got around to reviewing it. You can judge Kunkel's handlwork for youself in the article on accelerator boards in our previous issue (see "n'accelerator Boards: Power for a Price," PC Magazine, Volume 5 Number 15), and you can read my review of Perspective in the First Looks section of that issue.

AS YOU LIKE IT Three-dimensional graphs compress an amazing amount of data into a very small space, but power has its price. One price you pay is the ability to pick off data points accurately. Another is that low-lying points can be obscured by higher ones. Perspective solves much of the latter problem by allowing you to tilt and rotate the chart until all points are clearly visible.

But most 3-D graphs would be rendered unreadable by including the numbers on



the bars, as we do with simple bar graphs. Kunkel's solution, color-keyed access to the numeric table that generated the graph, is an unqualified success. It has something for everybody: Left-brained words-andnumbers types have all the facts, right down to the decimal points. Those of you who live in the right hemisphere, meanwhile, are free to draw impressions and get a feel for the data by looking at the overall "shape" of the results.

TRAINING THE READER During the design of our new benchmark graphics tests, I gave a visiting fireman's tour to Toby Hufman and Stan Hayes, principals in The Ad Works advertising agency in Atlanta. Hufman, who's from the design side, was awed by Kunkel's office, with its three computers and five monitors.

He waved at Kunkel's drafting table, clearly subordinated by all the hardware. "I used to be fond of saying that the designer's tools had it changed in 500 signer's tools had it changed in 500 thing new." Hufman looked at our design for the new benchmark tests. He was impressed. I told him of my concern that the replied that we were training readers to untural table that "Tem years ago, no one would have understood what you were doing. Today they take it in stride."

WORD WARS I'm always ready for a better word processing program. Over the years, I've spent a bundle willingly, even eagerly. I've spent a lot of time looking at

■ FROM THE EDITOR'S SCREEN

new products, trying to understand why people are excited about them. WordPerfect, PC Write, MindReader, Microsoft Word. Come one, come all. You can have a piece of my life.

The only thing I ask in return is some consideration. I've been function-keyed by MultiMate, second-guessed by Mind-Reader, and seduced by Word. This most recent affair of the heart hurts the most be-

cause there is so much that I like about Word. It is doubtless the most powerful print-formatting program, and it does the best tables of contents and indexes (though not easily). It has this great concept called style sheets. But the functions assigned to each major menu item seem arbitrary at best. For instance, you display "invisible" characters, such as spaces, from the Options menu. But you display other invisible items such as style tags from the Window menu. The Gallery menu doesn't necessarily show you your current style sheet. You have to override the default style sheet from the Format menu.

Why isn't there a built-in macro processor? Why does Word violate all of Microsoft's DOS rules? Why does it have the best disk-based tutorial I've ever seen yet no way to window it onto the screen next to (instead of overlaying) your working text? Despite the tutorial, Word is a complex program that takes time and care to learn.

Sometimes, though, the ends justify the means. I recently had an application in which the most important factor was the ease of producing highly formatted, camera-ready output from a laser printer. The typists had little or no computer experience. I looked at the alternatives; it was no contest. Word won. I taught them what they had to know (entering text, moving the cursor, invoking styles from the style

sheet, and saving the file) in half an hour. Of course, they didn't know about the five successive evenings that I spent cursing at Word and its obtuse aspects, trying to make it foolproof for them, learning enough so I could teach it effectively.

All in all, I have mixed feelings about Word. Microsoft is positioning it as a corporate word processor in addition to its strong presence as a professional word processor. While it has the requisite ingredients, such as exporting and importing Document Content Architecture files, excellent training, and spelling checking, it's too clunky and slow for my taste. I can't really say that DisplayWrite 3 and Multi-Mate are better, but we'll see what the corporate market has to say.

Despite my travails with Word, I feel good about it and the effort I've put into it. I almost feel guilty about Perspective because it's allowed me to be so productive with almost no effort. That's progress.

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Hardware development has taken giant steps ahead of software, thanks in large part to CAD software. Now it's software's turn to shine, by letting the computer do the programming.

esigning software quickly enough to keep up with the newest hardware has always been a problem. The problem got worse when hardware development was largely automated and enhanced by computer-aided design (CAD) software.

Software, like a traitor to its own kind, made it faster and easier to develop hardware. Now the most complex hardware designs can be prototyped faster than you can say, "You still use that old stuff?"

The newest software for hardware decolopment lets you design circuits, boards, and chips on the fly. One company makes a machine that can, like a photocopier, grind our prototype VLSI (very large scale integration) chips for instant use. Yet, act can't get a new word processor, and 1-2-3 is the last great software puckage. In other words, software is a laggard.

This just proves to me that hardware, and not software, drives the market, contrary to the old adage. Software is always trying to keep up with the latest in hardware development. This has to change.

SELF-PROGRAMMING SOFTWARE

It may change soon if a new generation of software evolves—the true self-programming compiler, or SPC, system. You can call these things is on-based program generators (BBPG), soonized flowshart compilers (BFCC), or whatever. The first one of any consequence will be released by Apple for its Macintosh. (By the way, this product is a big secret. Don't tell anyone!) Once the idea takes root, it will grow like a weed in a field of fertilizer.

The concept stems from some early games. The Pinball Construction set from Bill Budge is probably the root idea for the Apple product.

Game construction sets are a thing of beauty. You simply move icons around the screen, attach attributes, and play. Bill Atkinson of MacPain fame used Budge's ideas to make a programming language that works like a game construction set.

Think about it: all the best programs start off as flowcharts and are then coded by programmers. Let's skip the middleman. Let's simply use the flowchart icons, string them together, hit the button, and let the computer do the coding!

Since there are stock programming conventions and "most efficient" techniques for actual coding work (when done by the best of the best programmers), there is no reason a computer can't code the program from a flowchart. Loops will be structured in a particular, efficient way. Data input



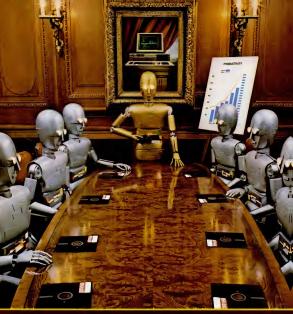
routines will be handled in the most efficient manner by the compiler. All the modern programmer will have to do is move a bunch of icons around on the screen just like a hardware designer moves chips around on his CAD machine.

This is CASD (computer-aided software development). The program-construction-set concept will speed up development of business software like we've never seen. It will allow easy development of customized vertical applications, too.

VERTICAL APPLICATIONS The pitin-the-sky vertical-applications software market has always been hobbled by the fact that within any industry group, each company does things its own way to such an extent that no generalized vertical application is remotely acceptable. So vertical applications software has never rocketed to glory as anticipated. CASD will change all that and revisible: the custom programming house—and maybe even make it possible for it to make money.

Just imagine moving flowchart icoms around to create a program. The best of these compilers will compiled directly into the digit and speedly machine code. Customization of the construction set with the program construction set develop a construction set to your liking. Then there will be a "construction set construction set." Not a bediese. Finally, look for an "ultimate bediese. Finally, look for an "ultimate bediese. Finally, look for an "ultimate bediese. Even the set of the se

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INSIDE TRACK

An ugly IBM rumor reemerges. Will it change the mask of the 80286 chip? The plot thickens.

Well, well, well, the runor that IBM big points to change the mass of the 80256 has surfaced again. IBM, as many of you know, has the masking rights to the Intel 80256 (hip. This means that IBM Can, if it desires, change some aspect of the chip to make it incompatible with other 80256 chips and therefore cut off the clone makers. Clones are now and to account for 50 percent of all 80256 or XI Type, machines. This is 80256 or XI Type, machines. This is revenue. So the thinking goes that IBM will pull a dirty trick like this to lock up the market.

Don't expect to see this ploy done with a remasked 80286 chip. It would take too long to test the chip for bugs. It's far easier and just as efficient to distribute new proprietary ROMs with "got-tash" in them as it is to change the CPU.

DISK DEPT. Have you ever wondered which colored floppy disks are the most popular? Well, I've always wondered, and so I asked a Sentinel disk salesperson. Could it be the burgundy, the purple, the pink, or the yellow disk? Wrong, wrong, wrong, and wrong. The most-popular colored disk is gray! A distant second is a group consisting of red, green, and blue. Is this pathetic or what? "A lot of manufacturers use the gray disk," I was told, "because it adds color but it doesn't offend anvone." No wonder the industry is in such doldrums. These manufacturers are afraid of their own shadows. Gray stinks!

own shadows. Gray stanks!

Speaking of gray, the show for the
gray-suited buyers, PC Expo, just finshed its New York run. The show was
designed for the big shots who buy by
the bushel. There was little of interest
for guys like me until I started poking!

around the innarris of machines. Guess what I found running Windows at the Microsoft booth ? A soon to be-announced 730 by 410 high-resoluties EGA-compatible card called the Deluce VEGA municipal control of the contr

Long term, the monitor business is still up for gash, and 1 expect Centith to grab it and run when it releases its incredible flat tension mask (FTS) series of monitors later this year or early 1957, and a central power process, and the central should be process, and the same while, we are starting to see a starting

Back to the Microsoft booth at PC Expo. The company was showing its new Mach 10 PC 80286 speed-up board. I thought Microsoft was going to phase out of the hardware business-guess not. The board has a cute little switch to turn it on and off so you can run your PC plain or as an AT. It costs about \$500, which includes Windows and a mouse. Incidentally, Microsoft has put the circuitry for its mouse board onto a single chip that it will sell to manufacturers. Look for Compag to use it in future designs. (I've always felt that someday the mouse will be like the car cigarette lighter. You'll always have it on hand whether you use it or not.)

Putting a complex or (in the case of the mouse interface) a simple circuit onto a single chip is the big trend today. Hercules put its parallel interface onto a single chip on its new Hercules Plus card. If you don't want LPT1 on the card, then you simply pull off the chip. Computer designer George Morrow always claimed that someday the chip business will be like the jelly bean business. "Chips will be cheaper than jelly beans," he used to say. I don't know what to call this flood of VI SI and custom chips. One manufacturer may have coined a term. "The semiconductor business is turning chicken chip!"

GENUNELY INTERESTING SOFT-WARE DEPT. IBM users who are protools orbiding their machines at high clock speech steve from that the special abspects have found that the special abspects have from the Board memory add-ons—which use the specification (EMS)—don't work prosperly at those high speech. Everything, the specified to work as a maximum rate of 8 MHz. Meanwhile, the 5000 you have to pup for these isn't chicken feed (but perhapes it is chicken feed (but perhapes it is chicken feed (but perhapes it is chicken feed).

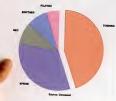
Along comes Above Disc from Tele-West of Irvine, California. For a mere \$69.95, you can emulate the EMS standard in software using any RAM card you want. In fact, this software lets you use virtual memory so that your hard disk or floppy disk can "look like"

EMS RAM to the system. Hot stuff.
These guys figure that when DOS 5.0
arrives, the 640K barrier will be gone,
and so why should the budget-conscious
waste money on an expensive EMS
card? The EMS cards should become
collector's items one day soon. It will
so right next to my Baby Blue Z-80 card.

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software by the thousands. But software doesn't do anything about speeding up the microprocessor (or CPU) speed. As you know the microprocessor is the brain of the computer that controls all the operations like screen updates and calculations like a spreadsheet makes.

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HERE IS WHAT MAKES IT SO SPECIAL.

First, it installs so easily. It is a half slot card, only five inches in length, You don't even have to give up a full slot. What's more, unlike competing products it works in the Compaq and most clones. The instructions are so simple we considered showing a picture of a child putting it in. Easy remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, it is advanced. The BREAKTHRU 286 replaces the CPU of the PC or XT with an 80286 microprocessor that is faster than the one found in the AT. A 16K cache memory provides zero-wait-access to the most recently used code and data. In benchmark tests the card accelerated software programs—both custom and off-the-shelf anywhere from 20% to as much as 700%. Wow!

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. It operates with LAN and mainframe communication products and conforms to the Lotus/Intel/Microsoft Expanded Memory Specification (EMS). Software

compatibility is virtually universal.

Fourth, it is the best there is. There are several other boards on the market. Some are priced about the same as the BREAKTHRU 286 and some are cheaper. We at PCSG have compared them all, but there simply was no comparison.

compared them all, but there simply was no comparison. What we discovered is that many cards being solid offer only a marginal speed up in spite of their claims. We found some to be merely versions of the obsolete 8088 or 8086, and other to be just poorly engineered. The 8MHz BREATHRU 286 is unequivocally the best executed and most completely reliable speedup board manufactured today.

PCSC has since early 1983 dominated the lap portable market with ROM software such as Lucid spreadsheet and Write ROM that reviewers rated as excellent. We were proud to successfully enter the IBM FC market last year with disk access speedup software. Now we are so pleased with the BREARTHEM speedup card. We use them on our own PC's to make them faster than AT's. We are really excited about this product.

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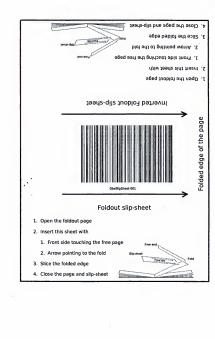
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THE NEW PC AT BIOS: SOME SUBTLE CHANGES



With the AT's new keyboard comes a new BIOS. While this BIOS lets you install more types of hard disk drives, it is incompatible with some very widely used programs.

Are recent break-in at-my office (which cost us six machines, both ATs and Compaq Deskpro 286s) has taught me some valuable lessons. It also gave me an opportunity to rethink my choice of the best available PCs and to explore IBM's newest changes in the PC family—particularly the new-style keyboard.

THE MIPORTANCE OF BACKUP One of the leasons that up disaster drives been in the value of backing everything up. Luckily, we had had for foresight to expluse of backing everything up. Luckily, we had had for foresight to every PC with a tage backup unit and to put a full sort of tages in our bank's safety ones to safe safe one; a week. Such prudence saved us a lot of grief. (News to of grief, of when the backup tage for my own PC was but, and that another tage required delicate repair work. That's just a dash of spice in the dish of life.)

A CHANGE OF HEART One of the advantages of losing everything is that you can start afresh; the disaster allowed us to rethink our choice of PCs. Not long ago I mentioned in this column (Volume 5 Number 8) that I was settling on the Compaq Deskpro 286 as a quasi-standard for our office machines because the Compag had a built-in tape backup, came with an 8-MHz speed (although just about everybody with a 6-MHz AT was souping it up to 8, including me), and had that nifty dual-mode display (good monochrome characters and CGA-style graphics). In addition, we were (justifiably) concerned about the reliability of the hard disk drives IBM had been putting into its ATs.

My experience with the Compaq since

then, however, has made me reconsider that opinion. For one thing, we had enough reliability problems with the Compaque particularly their power supplies to the property of the property of the property of their power supplies weren the sum of the programs such as Mirrasoff Word or Ashtonia False Framework; for that we need to use the Hercules Graphics Card. The biggest disappointment, though, was the megablyest, no slow, and too noisy to be then rectally as a backup medium.

So, we decided to go back to the good of 8-MHz AT. We equipped our ATs with Hercules carts for good graphics and 20-or 60-megabyte streaming tapes for back-up (we use the Maynard MaynStream, but there are other good alternatives, such as Tecmar's).



THE AT'S SUBTLE CHANGES In the process of buying these new AT's, I discovered some subtle changes in the PC family—most notably, that weird-and-wonderful keyboard that's become the new standard for the IBM family (and, I gather, for others as well).

As you probably know, IBM's new keyboard is very different from the old one. The two biggest changes are in the function and cunor keys. The keyboard now has 12 rather than 10 function keys, and the two columns of keys on the left side have become a single row of keys along the top. In addition, a separate numeric keypad and cursor set have replaced the keywad that combined these functions.

These changes in the keyboard affect more things than you might imagine. Because there are many more keys (including two Cursor Up keys), the details of how the keyboard talks to the computer and some subtle workings of the computer's internal control software, the BIOS, have had to be changed. And these changes have caused some very interesting problems.

COMPATIBILITY PROBLEMS The new keyboard is standard; consequently, it's on any machine that comes with the new BIOS. But for now—and probably just for a limited time—you can choose between the new and the old keyboard. Unfortunately, no matter which keyboard you choose, the new BIOS can cause software grief. And you can't always self ware grief. And you can't always telf which BIOS version you have by looking at the keyboard.

■ PETER NORTON

Luckily, there is another way to determine which BIOS you have: check the date marking stored in memory. On XTs the BIOS is dated 01/10/86 or later; on ATs it's 11/15/85 or later.

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(You can quickly and easily find the date of the BIOS in your PC by firing up DEBUG and giving it the command

D FFFF:5 L 8

Follow that with the command Q to get back to DOS. All IBM machines, and some other brands, have the BIOS date recorded where this command finds it.)

The problems with the BIOS for the new keyboard stem from the fact that some programs ''cheat,'' that is, work more intimately with the computer's hardware than they should. The more remotely a program interacts with the hardware, the less likely

■ In buying new ATs, I discovered subtle changes in the PC family—most notably a weird and wonderful keyboard.

it is to be disturbed by changes in the hardware design; conversely, the more intimate the interaction, the more likely problems become. This has been well known for a long time. But plenty of important PC programs have long bent or broken these unofficial rules.

For the most part, IBM and PC-clone makers (beginning with the highly respected Compaq) have gone to great lengths to avoid making life difficult for existing software. In the case of the PCjr, for instance, IBM made an enormous and admirable effort to ensure that lots of weird PC programs would run on it.

But in the case of this new keyboard BIOS, IBM neglected software compatibility for some very widely used programs, notably Framework and the two keyboard enhancers Prokey and SuperKey. (In my tests, SuperKey died completely with the new machines while, to their crodit, Pro-Key and Framework experienced only minor problems.) This seems amazing considering how many hundreds of thousands

of copies of these programs are in use.

The problem is enormous. If you are a
dedicated user of one of these programs
and you get the new machine (say, to expand your office or, like me, to replace an
old machine), you'll find that you can't use
your old software on it. That's a serious



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disruption when the software is an essential working tool for you.

We can speculate that the reason the new BIOS is incompatible with so much important software is either because IBM goofed or because it wanted to show the PC community who was in charge. But whether you chalk it up to stupidity or arrogance, it's a shock to the PC user.

In the end this problem will be solved, mostly by the appearance of new versions of the programs that have no trouble with the new BIOS—perhaps even before these words make it into print. So this will be a passing storm, but in the interim, lots and lots of PC users are going to have serious trouble coping with BM's new machines. Their inevitable frustrations won't increase consumer lovalty.

AN ADDED SURPRISE. There's more in the AT's new BIOS, however, than just the new keyboard handling. I was also surprised to discover that IBM has extended the range of hard disk drives that can be installed in the AT. Originally the AT could accommodate 14 different types of hard disk drives, ranging in size from 10 megabytes; to a whopping 115 megabytes; to a whopping 115 megabytes; to seck was type 2, holding 21 megabytes; the

 Some exploring with an interesting BASIC program revealed that the AT's new hard disk table has 8 new drives.

When I saw that my new ATs used drive type 20,1 knew that the list had expanded. A little exploring (with an interesting BA-SIC program that I'll share with you in a future column) revealed that the new hard disk table had 8 new drives, for a total of 22. There's nothing special in the new list, but some of them look a little odd.

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FCC CERTIFICATION WARS, PART 2



While the FCC is correct in making PCs meet RF standards, simple equity demands that the agency also crack down on such common noisemakers as can openers and blenders.

In the last issue I looked at some of the problems arising from the increasing ambient, or background, radio frequency and electromagnetic-interference (RF/EMI) noise that is polluting the environment.

The FCC has begun a much-publicized crackdown on PC hardware vendors whose equipment doesn't meet the tough Class A (office) and tougher Class B (home) standards. In the process, both reputations and tempers have suffered, and a lot of misinformation is being tossed around.

Producing a quiet PC isn't an easy job. Part of the trick lies in intelligent electronics design—using a custom clock circuit instead of a canned design for the clock crystal, good grounding of noise-prone multilayer motherboards, and on and on—but in many cases, actually building that quiet design is even tougher.

Looking under the hood of a PC through the eyes of a noise detective is a fascinating experience. And tracking changes over the production life of a machine is intriguing.

In early IBM PC/rs, for example, you'll find that Big Blue asplied nickel-acrylic paint to the inside of the cabinet for noiseshielding. That's a good and relatively inexpensive solution to the problem since nickel-acrylic paint costs only about \$50 a gallon.

But look inside later PCjrs and you'll find a cabinet sprayed with silver paint, which costs \$2,000 a gallon. Do you think maybe IBM had some problems producing quiet PCjrs and decided to throw money. in the form of a very expensive solution, at those problems?

USER SABOTAGE No matter how much designers and makers of PCs do and spend, they can't do much about how you and I often effectively undermine their best

Probably our simplest and most common failing is not screwing in cable connectors from the monitor to the PC and from the PC to such peripherals as modems, printers, and plotters. Both logic and self-interest seem to argue for screwing down those connectors tightly so that they don't fall out.

But if your PC or printer is wedged into a comer or against a wall—making those connectors hard for you to reach—or if you tend to swap components around fairly frequently, you may well have just skipped screwing in those connections.

And, in the process, you've defeated



most of the PC makers' efforts to reduce noise, by turning those cables into antennae that radiate noise far from your desk.

In addition, users often fail to ground their equipment adequately. Do you have one of those nice expansion chassis sitting next to your PC? Did you remember to install the little metal grounding strap? Did you connect the little grounding loop on your printer cable to a good ground on the printer?

Speaking of cables, are you using highquality shielded cables—those with full metal-braid shielding, connected securely through 360 degrees to the connectors at both ends?

Foil shielding doesn't make for good

connections. While it may be OK for ordinary PCs, the higher-speed operation of AT-class machines, which produces more noise, demands braided-cable shielding. Not only is braided shielding not required by law, but unshielded cables are still widely sold.

Which leads to a fair question: if the FCC is cracking down on PC vendors, are there other things it should be looking into?

You bet. But it's not.

UNEVEN REGULATION For one thing, there's absolutely no regulation of such spectacular generators of RF pollution as electric can openers, light dimmers, refrigerators, and blenders, among hundreds of other everyday sources. For a taste of just how intense these RF fields can be, hold a portable AM radio near bectric can opener or a blender sometime.

JIM SEYMOUR

you'll hear noise pollution at work.

A bigger issue by far is that the FCC is dealing with only one side of the equation: the generation of noise. Electronic devices' susceptibility to RF/EMI noise is the

other side, and although the FCC has had the authority since 1983 to require lower susceptibility to noise in the radios and televisions (and yes, PCs) we buy, it hasn't acted vet.

To be sure, it's better to reduce poise at the source than to inflict the costs of noiseresistance steps on the buyers of receiving devices, many of whom couldn't care less about the Joy of Computing.

A RATIONAL POLICY? But now that the FCC has begun taking such draconian steps against PC producers, wouldn't simple equity and good public policy also dictate similar action against such prolific sources of RF/EMI poise as blenders and can openers?

The amount of shielding required to protect your televison or radio from the RF/EMI noise level we now live with far exceeds the amount necessary to shield

No matter how much designers and makers of PCs do and spend, they can't do much about how you and I often effectively undermine their best efforts.

against the noise emitted by PCs. Shouldn't a rational public policy acknowledge this fact?

I started looking into the FCC's PC-industry crackdown because I was skeptical of the real-world importance of FCC-compliant PCs. But, in the process I became a believer and now see those FCC inspectors playing watchdog against more noise as heroes, not villains.

What I want to see next is a little action from the FCC bosses, who need to level the field and acknowledge that PCs' noise pollution is just a drop in the bucket of the RF/EMI garbage that the unregulated appliance industry is dumping on us. And instead of just complaining about RF noise from personal computers, the FCC should keep up the good work by going after the makers of the currently unregulated TV sets, radios, and hi-fis,

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weary pitgrim could no longer bear the oppressiveness of his existence. "Exalted maker and ruler of the universe." he apostrophized, "how is it that a planet such as ours, so rich and manifestly bourtiff, is yet sourged with such manifold afflictions as hatted, famine, disease, war, and Sylvester Stallone?"

As if in answer, the skies grew dark.

As if in answer, the skies grew dark. Thunderbolts flashed on every side. To his astonishment, the pilgrim heard a lordly voice fill the air with slightly apologetic words. "What do you expect?" the voice intoned. "It's only Version 1.0."

AXIOM 1 There are no deities in my neck of the metropolis, but we've got on enck of the metropolis, but we've got on once of other metropolis, but we've got on once of the metropolis on the metropolis on of metropolis on the metropolis on the metropolis of the met

Words to live by, all right. No matter what you're buying, software or hardware, if it's new, it will almost work. Almost. In the computer world, as opponents of the goody Star Wars schemes have astutely pointed out, getting things absolutely right the first time is neither expected, demanded, nor likely.

In marketing circles the purchasers of the hottest new technologies are known as "pioneers." In computer circles they're "unpaid beta testers." In laymen's circles they're "euinea pies." But it doesn't seem to matter what you buy, new tech or modified old-hat: buy it early and the bugs are guaranteed to bite. Purchasing a brandnew product gives you a golden opportunity to develop an intimate relationship with support personnel.

There's no need to enumerate. If you haven't run into problems, you're Gladstone Gander, the World's Luckiest Duck. Or you've sensibly come late to the party, when there's somebody around to warn you about the rancid chips.

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fortunately, in a world moving as fast as this one, adhering to Axiom I presents real problems. Buy early and, no doubt about it, you will pay the considerable price of pioneering. But wait until a product is mature and, dollars to donuts, a newer and seductive but untested high-performance, low-serial competitor will be out there giving you come-hirther looks.



Even when a new product works, you know you'll get atomy when the incivible upgade cones along. There may well be few doom people still using the original single-saded IBM PC disk drives that came with the low-serial, early-model machines. The rest, having discovered that commercial software no longer acknowledges these particular antiquities, long ago put the them-condicinable price of turning the different contraction of the properties. The properties of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the protee of the properties of the properties of the properties of the protee of the properties of the properties of the properties of the protee of the properties of the properties of the properties of the protee of the properties of the properties of the properties of the protee of the properties of the properties of the properties of the protee of the properties of the prope

architecture has saved many a pioneer's bacon. Even if your dust-covered ROM BIOS isn't up to handling hard disks or the EGA, you can swap it—for a fee, of course. And you can add just about any per ribheral you can think of.

But pioneering has become more rigioous. The Daniel Boones of the AT world have been particularly unfortunate. Even though their machines might have saved them more time than their hard disk agonies frittered away, they're now a wee bit miffed that IBM doesn't offer them an official way to upgrade their machines to the new def facto 8-MHz standard or to plug in the new ketyboots.

Or are they really so unfortunate? In typical low-serial fashion, the new ROM BIOS routines designed for the low-serial keyboard don't work quite as expected with many long-established programs.

Which confirms the Upgrade Theorem founded on Axiom 1: Don't buy early versions of upgrades and revisions, either. According to one recent article, the probability of introducing one or more new er-

■ STEPHEN MANES

rors in a program while eliminating a known one ranges from 15 percent to near certainty. The theorem is corroborated by virtually every new release of an old standby replete with new defects.

TIME BOMBS Alas, you're probably not going to learn about these things from initial reviews, no matter how assiduously the reviewer performs his task. Back when software came in a Ziploc bag, you could

usually find major bugs in a couple of minutes. Today, any program revealing its problems that fast is likely to find itself in the to-be-reformatted section of the disk organizer.

organizer.

Increasingly complex software and hardware create subtler problems that don't crop up until you've explored the product much longer than most reviewers can afford to Reviewers can't be expected to discover a software glitch that turns up only on machines with precisely 640K bytes of memory, only when a particular type of memory-resident software is loaded, or only on certain RC flowers.

SELF-DEFENSE. One sensible defense as to wait until user groups and the computes to be sensible to the sensibl

Besides, there are plenty of anomalies left even in mature products that won't turn up on your system until the worst possible moment. So if you're planning on devoting your data to any pioneeting system, draw those wagons in a circle. Write down the worst possible scenarios you can possibly imagine, and then simulate them with the precise configuration you're thinking of using.

Create a gigantic dummy file, and see what happens when you try to modify it. Use a RAMidsk to simulate a disk-full condition, and see if your data can survive it. If you've got a network or multiuser system, have a couple of users try to modify the same file and record at the same time.

You may not like the results, but when you finally get through to the support people after listening to half an hour of "The Valley's Only Lite Music Station," at least you'll be able to chuckle philosophically when you hear a dulcet voice coo, "What do you expect? It's only Version 4,370."



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DIARY OF A PSEUDO **POWER USER**



Alsop knows a lot about the PC industry, but he's less of a techie than most people think. He tried to close the gap in a recent struggle to get his new Compag running.

equip me with a computer recently. It isn't just any old computer, it's the best: a Compaq Deskpro 286 with 512K bytes of memory and a 30-megabyte hard disk, a Video 7 EGA, a NEC Multisync monitor, an Intel Above Board/ AT with 2 megabytes of memory, a Hayes 2400B internal modern, and a Hewlett-Packard Laseriet Plus printer.

My lack of technical experience with computers has been something of a closely guarded secret, since I'm supposed to know all about the infernal machines. Perhaps that's why I have some empathy for people who are still trying to figure out how to use the things. Anyway, I figured I had better give the magazine its money's worth. So I decided to find out how to become one of those fabled power users who know how to write a CONFIG.SYS file and the difference between LPT and COM. This is my journal of discovery.

SATURDAY (That's right, Saturday. I've got a job to do and can't spend my working hours messing around with a computer.) I decide to install all the boards at once, just to see if I can get the thing to boot up right off the bat. Foolish me. I take the case off the Compag. This job

appears to require a special nut driver, which I happen to have lying around from reviewing another Compag model. How do normal people get the case of?? I have to take a special lock off the hard

disk and plug in its power cable. My fingers are too big and fat to maneuver the power-supply plug into the 2-inch-wide

C Magazine was kind enough to crevice behind the disk drive. A pair of pliers finally helps me get it in. Why did Compaq detach the power supply for shipping, particularly since this task added 20 sweaty minutes to the installation? I swap the Compaq's video board for

the Video 7, stick in the Above Board, and then stick in the Haves board. There are now six boards inside the computer, including Compaq's hard disk card, memory board, and serial- and parallel-port card. I haven't even turned on the power yet: that must qualify me as a power user.

I slide the case back on, screw in the screws, plug the monitor cable into the monitor and the computer, and plug in the power cords for the monitor and computer. It looks great sitting there, but it's taken me a couple of hours to get this far.

SUNDAY I pop up to the office bright and early, stick the DOS disk in the computer, and push the switch. It boots right



up, and now I want to format the hard disk. Don't ask me why, but I decide to use IBM's PC-DOS instead of Compag's, So I study the manual and discover that there is a command called FDISK for formatting hard disks.

Disaster looms: the computer won't recognize the hard drive. Guilt. Insecurity. Fear and loathing. I'm supposed to know what I'm doing and the computer won't recognize the hard drive. There's obviously more to being a power user than meets the eve. I run Compag's diagnostics program. It tells me I have Error 1702-40, which is useless information since I don't have anything that tells me what that means. I think I messed something up by using IBM DOS on a Compan. Maybe I hurt the controller card when I was setting up the hard disk. I call up 47th Street Photo, where I bought my equipment (they work on Sundays). They're distressed, since they formatted and checked the drive before shipping. I order a copy of Compaq DOS, which they've promised me I'll get on Tuesday.

MONDAY I do real work on my original computer.

TUESDAY Compaq DOS arrives as promised, along with a copy of Compaq's advanced diagnostics. I use the latter to do a very low-level format of the hard disk. After 4 hours, it gives me the same error code I got before. It took 4 hours to tell me what I already knew, which was nothing. I'm beginning to dream about being just another dumb user.

■ STEWART ALSOP

WEDNESDAY My deadlines are slipping by inexorably, and the unanswered phone calls are backing up like traffic at a toll booth. I get on the phone with 47th Street Photo's computer salespeople. By

now, I'm sure they're wishing they hadn't sold me this computer. We determine jointly that neither of us knows what happened to the disk. They send a whole new machine overnight.

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THURSDAY Federal Express arrives with the new machine. The guy is not rhilled about lugging the new 99-pound machine up the stairs and the old one body of the count. (Here you exist the count of the you exist the count of the you exist the young the young

I remove the case, swap video boards, and

hook up the monitor.

Compaq DOS features a command called DISKINIT; which makes hard disk formatting idelored. But my first DISK. INIT takes 43 minutes to discover that visually every rack on the backup floopy I used is bad. So I format a more reliable-booking floopy disk: this time DISKINIT tells me quickly that I've got the wrong same drive hat formatted the floopy. For tunately, a real power user is visiting and tells me to formatted the floopy. To tunately, a real power user is visiting and tells me to format with DOS 2.10 nm and tells me to format with DOS 2.10 nm yother computer and try that. It works perfectly, but I can't tell you why.

ODYSSEY'S END Voilà. I now have a formatted and working hard disk. One by one. I install the other boards and reconfigure the machine for each one. I end up with a perfectly functioning power system, with an 80286 processor, 2.5 megabytes of memory, 30 megabytes of storage, and high-resolution graphics. It only took me 6 days, including about 20 hours of real time, and I haven't processed a single word, put out a single page, communicated a single memo, or crunched a single number. But I have learned how to modify AUTOEXEC BAT and CONFIG SYS files, run diagnostic programs, and partition hard disks.

too hard disks.

I'm still no really a power user.

I'm still no really a power user.

I'm still now a primitive dolight property of the property of the property of the
just spent a better part of a week gesting the
machine to start up correctly. I haven't
even tried the printer, the modern, or any
applications software. Sales of these
machines produce revenues of more than \$10
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pread some of that movey developing a lit
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TECHNOLOGY Nine State-of-the-Art Scanners

Nobody believes in the paperless office anymore. In the ideal workplace of the future, stacks of paper will still arrive on our desks, but we'll be able to transform them effortlessly into ASCII characters and bit-mapped graphics. We'll edit, manipulate, and combine these words and images before printing them out on last printers and sending I tieal character readers (OCRs), or text

them out on laser printers and sending fresh, typeset-quality pages on to clutter other people's desks.

Most of the components of this attrac-

tive scenario are already in place in our offices. The device that will handle the paper-to-screen transformation, however, is an oy 4 a widely used peripheral. Most PC users perceive text and graphics scanners as clunky, inaccurate, and expensive. But changes in scanning technology over the past year have produced a new generation of scanners that may soon be as indispensable as printers and monitors.

A year ago, the desktop scanning market divided neatly into two categories. Op-

tical character readers (OCRs), or text canners, scanner printed text and produced ASCII output in one of several formats. These units, spriced from about \$5,000 to about \$10,000, were intended printingly for use as data entry tools, notable in offices making the transition from paper to electronic storage. Craphe's scanners, ranging in price from under \$2,000 to \$10,000, and \$10

Today, most available scanners have or will soon have both graphics and text capabilities. This year's crop of new scanners is

A year has made an astonishing difference in the scanner marketplace. Prices have dropped significantly, while capabilities have soared. The most important recent advance: with just one unit you can scan both graphics and text.



a large one: Datacopy has introduced the 730 series, which pushes its previous graphics resolution to 300 dots per inch. Companies that have been in the scanning business for years, such as Compuscan, Dest, and SpectraFAX (previously LaserFAX), have new products; companies like Tecnar that have been active in

Scanning hardware itself has not changed radically in the last year; most of the changes have taken place in the software used to process the scanned page.

other markets have entered this field; and new companies, like Palantir, have surfaced from out of nowhere

Even the venerable Kurzweil 4000, which scans typeset pages, now has chalengers in the market it created and owned just a year ago. Palantit's Compound Document Processor (CDP) scans proportional type without needing to be taught the type-face beforehand, handles page formatting without input from an operator, and processes sranbite images.

The new scanners are smaller, and in some cases faster, than their predecessors. For example, Dest's new FC Scan, the smallest automatic OCR on the market, is small enough to fit unobtrasively between the standard of the smallest scanner available last year and my totic for product of the year, disappeared from view for a time and resurfaced twice—first advertised by Texas OCR Systems and then by GA.S. International.)

In short, the scanner marketplace has changed dramatically in a year. The scanning hardware itself has not changed radically; most of the changes have taken place in the software used to process the scanned page. These include new methods for processing halftones, editing graphic images, compressing data, and combining text and graphics.

OCR TECHNOLOGY The first steps of the scanning process are essentially the same for both text and graphics. Depending on the scanner's design, either the page is moved over a fixed scanning element or the scanning element is moved over a fixed page. The most common method is to move the page through a paper path that can position and move the page incrementally for scanning.

Once a page is in position to be scanned, it is illuminated by a low-frequency light, usually red or yellow neon. The dark areas absorb the light while the light areas reflect it. The reflected light is focused and then aimed at a photodiod arary or a CCD (charged coupled device), which translates areas of light and dark into binary data (Os and 1s).

From that point on, the data manipulation processes for characters and graphics are very different. Most text scanners digitize the characters a line at a time and then isolate them, character by character, into frames ranging from 24 by 40 pixels up to 30 by 50 pixels. The individual frames are stored in RAM for character recognition processing. The most common method of recognition is matrix matching, in which frames of scanned characters are compared against a table of known characters until a successful match is found. Most manufacturers of mid-range OCRs use some variation of this method. A more sophisticated method is pattern recognition, also knownas topographical character analysis or feature extraction. This method uses shape tables instead of character frames. Components of the scanned characters are compared against the shape table, allowing a wider range of typefaces to be matched

Almost all scanner manufacturers now also offer formatting software, which converts white space into tabs, margins, and line endings so that the text is readable by several popular word processing programs.

GRAPHICS No machine yet exists that can scan a page and interpret text and graphics in a single pass, although Challenging the Scanners

At first glance, the four sample pages we used to test the scanners' capabilities do not look terribly difficult. Yet each page presented its own challenges.

The business letter and price list (top and bottom left) lessed set scaeming features. The letterhead on the first page, which is not monospoed, confused most OR of software and resulted in a trail of gerbage characters. The letter is printed in the Courier 10 font, but it was produced on a Ricol laser printer and it slightly thicker but from from printer and its alightly thicker but them though the significant in the courier of the cour

matching. The signature, like the letterhead, usually left a trail of garbage in its wake.

The price list helped us determine whether Off formatting software can interpret tabs in the seamed text and format the output file with tab spaces or with white space. The decimalaligned tabs on the far right further test the formatting software's capabilities.

The 18th-century stching of compositors (top right) is a phatocopy, which we felt would be the typical source for many scanned images. The tightly spaced lines tested the scanners' ability to resolve detail—a set all nine passed. We included the last page, comprising related line drawings, in case the scanners could not resolve the detail.

Palantir's CDP comes very close. Graphic images are processed in a separate step. Most of the work involves resolving shades of gray into the appropriate pixel densities and compressing the massive amount of data produced by scanning a typical page. Scanner software has come a long way over the past year in both areas.

Commercial printers face much the same problem as graphic scanning software does: how to convert a picture to dots so that it can be printed. Line drawings are black and white; tonal quality is usually achieved by placing lines or dots closer together (crosshatching or stippling, for example). Line art is easy to scan because the demarcation between black and white is clear. Continuous-tone art is another matter. Photographs, pencil sketches, and pastel renderings have varying shades instead of clearly defined areas of black and white. To reproduce such pictures, printers use a mechanical process called halftoning, which breaks a picture into a pattern of black and white dots. Halftones are made by placing a screen between the image and SOCIETY FOR THE PRESERVATION OF LEAD TYPE 1600 East Industry Particip Handware 68 62001 (865) 205-1112

August 8, 1986

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Mr Price:

Thank you for your kind letter and generous contribution to the Society for the Preservation of Lead Type. He feel that as business reset to embrace electronic desktop publishing, it is important to pause for a moment and look back at the rich and waried history that has made it possible.

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I wish you success is finding the Albion or Columbia press; unfortunately we do not know where you eight atert looking in either the united States or Great Britisin. Hewritheless, we hope your work proceeds as placed, and that you communicate with us oftmo.

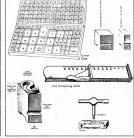
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This illustration shows traditional lith century confisses
estimating type. The 30c cases center and lettin hold a font of type
tenting type. The 30c cases center and lettin hold a font, of type
of the sterming as needed, but the composing stick in the 1st header
of each composition.

The man at the right is leveling a ferm of type locked in the cheek. So uses a small mellet in tap the form on a marble table. Above these men heng freely printed pages, pulled from a precing press.



SCANNERS

a photographic negative. Newspapers, which use coarse paper, use 65-dot-perinch screens; magazines like the one you're reading can use much finer screens, from 100 to 120 dpi.

Most scanners have little trouble with line art, but continuous tone, even when it is halftoned, is more difficult. The scanner software does its best to resolve continuous tones into various dot densities. If the scanner can resolve the halftone dots, it will scan them: otherwise it breaks gray levels into dot densities based on internal

algorithms. The results are often similar to 1 those achieved by photocopying a photograph; gray shades are converted into black and white and, depending on the type of photo, the gray may solarize or drop out altogether.

After the scanner software has decoded as much information about the page as possible, it must compress the data. A full page scanned at 240 dpi contains over 5 million dots; at 300 dpi it's nearly 8 million dots. That means the average page of graphics chews up from 1 to 11/2 million

bytes of information. With the 32-megabyte-per-sector limit on hard disks, you can store only a handful of images before running out of space. Some users can get around this limitation by investing in a WORM (write-once, read-mostly) CD-ROM, but that is not practical for applications in which you want to reuse and

Most scanner software includes a data compression program that reduces the number of dots you need to store. Since the data-compression method usually follows

change scanned graphics.

Scanners: Summar	y of Feat	ures			1.5	refile ()	1
MAA DE				Paper Handillo			
Product/ Manufacturer	List price	Size (inches; h×w×d)	Scanner Interface	Maximum scan size (inches)	Single sheets	Bound material	Paper food
Canon USA	\$1,685	394×13×11/4	Serial	10×24	Yes	No	Up to 5 sheet maximum
eSCAN fectuar Inc.	\$2,495	10½×13×13½	DMA interface card	8½×14	Yes	Yes	Single sheet, feed
Personal Scanner 2000 lectronic Information Technology Inc	\$2,496	10½×13×13½	DMA interface card	81/2×14	Yes	Yes	Single sheet, feed
Microtek MS 300A dicrotek Labs Inc.	\$2,500*	4½×15×17	Serial or parallel	81/2×14	Yes	No	1 sheet at a t
PC Scan Dest Corp.	\$2,785	4×16×11½	DMA interface card	8½×14	Yes	No	Single sheet feed
Datacopy 730 Datacopy Corp.	\$3,950	516×15×1916	DMA interface card	8½×11	Yes	Yes	Single sheet feed
SpectraFAX 200 SpectraFAX Corp.	\$3,995	10×25×15	Serial	8½×14	Yes	Yes	No
Compuscan PCS 230 Compuscan inc.	\$5,696	8×17×19	Serial	8½ × 16	Yes	No	50 page, bir
Compound Document Processor	\$39,500	10×17×29	Serial, Ethernet†, Massbuss†	8½×14	Yes	No	50 page, bir

the standards for Group 3 or Group 4 facsimilar transmission machines, you of Group 4 facissimal transmission machines, you of the group also use of the standard facility of your graphics will also use of the standard facility of the group and the standard facility of the group and the group of the

space as well as dots, you can edit the

graphic image using a program like Media Cybernetics's Dr. HALO or Zsoft's PC Paintbrush and grab a screen for editing and storage. In most cases you will want to edit the original anyway, and you can save

megabytes of space this way. Most available scanner software lets you size, edit, and print an image. The eSCAN and Datacopy programs allow you to merge scanned graphics with text by adding marks within the text file that define the graphic image area. The text file is printed from within the scanner software,

which grabs the graphic from the correct directory and inserts it into the text as marked.

MARKET SEGMENTS One reason so many scanner manufacturers have added graphics capabilities is to capitalize on the anticipated boom-time growth of electronic publishing. Almost all the manufacturers I spoke with see scanners as an integral part of that growth. It remains to be seen whether developers of desktop publishing software will see scanners as integral to

ext Scaees	*9	wraphics scareing									
Speed	Moselece typeleces	Proportional typelaces	Output	Word processor format	Page format	Resolution (dots per lock)	Hetf- toping	Com- pression	File formet	Graphics editing	Merge text and graphics
.67 pages/ minute	Any standard monospaced font; 5-20 point size	N/A	N/A	WordStay, Word- Perfect, MultiWate, or any word proces- sor that doesn't take over keyboard	Paragraphs, centering, indents	75, 150, 200, or 300	Yes (etores up to 32 gray tones)	Yes	Bit-mapped/ FAX	Yes	Yes, but text is bit-mapped
page/ minute	Courier 10, Courier 12, Pica 10, Letter Gothic, OCR-A, OCR-B	NA	ASCII	PFS Write, Volkswriter, WordStar 2000, WordPerfect	Paragraphe, centering, indents, tabs, form feeds	100-300 vertical, 200/240/ 300 horizontal	None	Yes	Bit-mapped, compressed print	Yee	Yes
page/ minute	Courier 10, Courier 12, Pica 10, Letter Gothic, OCR-A, OCR-B	NA	ASCII text	PFS Write, Volkswriter, WordStar 2000, WordPerfect	Paragraphs, centering, indents, tabe, torm feeds	100-300 vertical, 200/240/ 300 horizontal	None	Yes	Bit-mapped, compressed print	Yes	Yes
67 pages/ minute	Any standard monospaced font; 5–20 point size	N/A	N/A	WordStar, Word- Perfect, MultMate, or any word proces- sor that doesn't take over keyboard	Paragraphs, centering, indents	200	Yes	Yes	Bit-mapped	Yes	Yes
2 pages/ minute	Courier 10, Courier 12, Pica, Prestige Pica, Eilte, Prestige Eilte, Letter Gothic, OCR-B	Bold, Cubic, Madeline, Modern, Roman, Triad	ASCII text	IBM DisplayWrite Series, MultiMate, WordStar, WordStar 2000	Paragraphs, centering, indente, tabs, form feeds, undertining	N/A	N/A	N/A	N/A	N/A	N/A
11/2 pages/ minute	Courier 10, Courier 12, Pica, Prestige Pica, Elite, Prestige Elite, Epson Pica 10, Epson Elite 12, HP Laseryt Courier 10, OCR-A, OCR-B	N/A	ASCII	IBM Personal Editor, DisplayWrite, MultiMate, Microsoft Word, Volkswriter, WordStar, WordStar 2000, WordPerfect	Paragraphs, cantering, indents, tabs, form feeds, underlining	240/300	Yes	Yes	Bit-mapped, compressed print	Yes	Yes
N/A	N/A	N/A	N/A	N/A	N/A	200	None	Yes	Bit-mapped	Yes	Yes, but text is bit-mapped
2 pages/ minute	Courier 10/72, Courier 12, Pica, Esteem Pica, Eilte, Brougham 10, Letter Gothic	Bold, Bold Legal, Cubic, Madeline, Modern, Roman, Triad	ASCII	DisplayWrite, MuthMate, SAMHA Word, Volkswriter, WordStar, WordStar 2000, WordPerfect	Paragraphs, centering, indents, tabs, form feeds, underlining	N/A	N/A	N/A	N/A	N/A	N/A
8 pages/ minute	All fonts	All fonts‡	ASCU	N/A	Complete page format or galley	300	Yes	Yes	Proprietary	Yes	Application

their growth. This potentially symbiotic relationship is still in the courtship phase.

Scanner manufacturers also hope to tap into a large existing base of fax machines. By adopting the CCITT (Consultative Committee on International Telephone and Telegraph) standards for data compression, scanner manufacturers make it possible to turn a PC into a fax machine and allow economical long-distance transfer of scanned graphics images from PC to

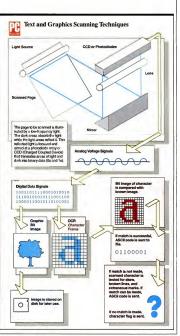
Scanners have come far in just a year, but they still have a long way to go before they become as commonplace as printers. A number of problems continue to hinder them from achieving widespread acceptance in the office environment.

TEXT PROBLEMS One problem that few scanner manufacturers have solved involves scanning dot matrix print. You might imagine that simple characters such as these would be the easiest to scan, but only a few manufacturers (Datacopy and Dest, with EIT planning to add the capability soon) can actually do it. The reason most commonly cited by manufacturers is that the standard 9 by 9 dot matrix characters that the standard 9 by 9 dot matrix characters.



Palanti's Compound Document Processor is by far the most sexting and versatile of the nine scanners reviewed here. Its ability to read any monospaced or proportionally spaced typefice makes it worth every penny for high-volume scanning applications. For most scanning tasks, however, its \$39,500 price makes it impractical, especially since many affordable scanners are now available.

In its price range, the Datacopy 730 is the best text and graphics scanner around. The built-in halftone capability alone makes it the best choice for the widest range of image scanning. The text scanning capability, though somewhat clumsy, is adequate to the task and shows promise.



ter cell doesn't have enough detail to be scanned. Most OCR character matrices are about 30 by 40 dpi, four times more detailed than the average 9 by 9 dot matrix character matrix. The OCR matrix, which can misread a speck of dirt smaller than the dot of an i, cannot recognize the spartan detail of dot matrix print.

Another deficiency is that most scanners can scan only an entire page. The ability to scan areas of data selectively, which only Palantir's CDP can do, would be a big improvement over standard page-oriented text scanning. A related problem is data formatting: all text scanners offer some form of text formatting that allows text to be placed in a compatible file format for your word processor, but not one OCR software package offers a similar option for entering data in a spreadsheet or database. This capability would make scanners attractive to a wider audience.

GRAPHICS PROBLEMS Graphics scanning is relatively new, and its deficiencies may be corrected over time. Despite some improvements in data compression and scanning resolution, though, several areas need immediate attention The single biggest problem is that scanned graphics are bit mapped, while most CAD software uses vectors. The CAD market is larger than either the publishing or fax market, yet no one has come out with software that makes the conversion from bitmapped to vector graphics possible. Savvy third-party developers, take note.

The other major deficiency is not the fault of scanner manufacturers but of the PC hardware itself. Even enhanced graphics monitors are woefully inadequate to the task of displaying a scanned graphic page, and even if they could do it, the 640K-byte address space is too small to display a whole graphic without severe data compression. Scanner manufacturers are caught in the middle, as are users. Until the industry resolves the questions of memory addressing and high-resolution bitmapped displays, graphics users will have to content themselves with working on portions of a page separately.

FUTURE PROMISE In spite of these deficiencies, the scanner market holds much promise. Most of this year's products offer a wider range of font recognition, improved text formatting, and improved user interfaces. The graphicsediting capabilities that were just becoming available last year are now mature products. Although a year has made a significant difference in the scanner market, you needn't fear that the scanner you buy today will be outdated in another year. Most of this year's major improvements have affected software, not base hardware: if you bought your scanner last year, you probably needed no more than a software upgrade to bring you up to date. Next

year's changes will probably be similar. Tom Stanton is a free-lance writer based in Manchester, New Hampshire. Diane Burns and S. Venit are frequent contributors to PC Magazine.

Canon IX-12

-Tom Stanton

The new Canon IX-12 is the smallest and lowest-priced scanner reviewed here, but it offers all the functionality of more-expensive models. Unfortunately, I ran into a few glitches trying to get it running, owing primarily to the fact that the machine was still not officially released at the time I tested it.

The compact Canon IX-12 measures a mere 31/4 inches high by 13 inches wide by 111/2 inches deep. It has a single power-on light on top. Pages feed one at a time through the front of the scanner and exit at the back, where a hopper catches them. The panel between the paper entry and exit slots opens easily so that paper jams can be easily cleared. The sensitive charged coupled device scanning hardware is recessed-only the rollers are exposed when you lift this panel.

INSTALLATION The Canon 1X-12 comes with a full-sized card to be inserted into an expansion slot, PC Paintbrush software configured for use with the Canon scanner, and OCR Systems' OCR software, which Canon calls Typereader. You must configure PC Paintbrush for your monitor and printer and add IXHND2 (a batch file that runs the program and sets the interrupt vector) to the PAINT.BAT

PC Paintbrush handles graphics scanning. It is directly compatible with other programs that can merge text and graphics,



Canon bundles PC Painthrush with its scanner. In this screen, which shows the scanning dialog box, you can adjust various aspects of the image. including its resolution.



The Conon IX-12 is the tinies and (at \$895) most inexpensive scanner we tested. Its small footprint (13 by 111/2 inches) makes it a good candidate for desktop use.



SOCIETY FOR THE PRESERVATION OF LEAD TYPE

This illustration shows traditional lith cantury craftman setting type. The job cases [center and left) hald a font of type for the todposer. Other job cases [background; could be placed on the ctands as received, Bote the composing stick in the left band of #adh compositor.

The fan at the right is leveling a form of type locked in the chies. He uses a small sellet to tag the form on a marble table. Move these man bang frommly printed pages, pelled from a proofing press.

One of the test pages, scanned by the Canon IX-12 and printed out by an Epson MX-100. The quality is not very high but would suffice for many draft or in-house applications. and it also comes bundled with other scanners, such as the SpectraFAX 200. You choose the scanning option from PC Paintbrush's Pase monu.

OCR Systems' Typereader software takes care of text seaning functions. Much of the IX-12's high-end functionality comes from this sophisticated software, which also comes with some of the more expensive scanners. OCR Systems claims that Typereader can read text as small as 6 points (½; inch high) as well as headline type.

TEXT AND GRAPHICS SCANNING Unfortunately, we could not test the IX-

Distributions of the Cold in t

We had better luck with the graphics scanning facility. It took the LX-12 I minute, 19 seconds to scan a full 8½- by 11-inch page. We couldn't get the 300-dpi scan to print on our Epson printer, but the 200-dpi and 150-dpi versions of the same image printed easily. The problem of printing 300-dpi images to lower-resolution printers should be corrected with the final release of the product.

Despite our difficulties with the



Canon IX-12 Canon USA One Canon Plaza Lake Success, NY 11042-9979 (\$16) 488-6700 List Price: Scanner, \$895; interface card,

\$295; OCR software, \$595 (\$495 if bought with scanner) Requires: 384K RAM, two floppy disk drives or hard disk drive, pointing device,

graphics board (color or monochrome, depending on the software used). In Short: Despite its low price and compact size, the Canon IX-12 is a full-featured scanner with text and graphics capabilities. The ne-release vention reviewed was obsured by

glitches that should be ironed out in the release model.

CROLE \$71 ON FEADER SERVICE CARD prorelease version of this equipment, we liked this scanner a lot. Its compactness and price certainly enhance its attractiveness. Though it probably won't be cost effective for high-volume uses, it will be an obvious choice if price is an anjar consideration, a good choice if a satheties and size are important, and a justifiable choice for anyone who simply wants to experiment with scanning technology.

—Daine Burns and S. Venit

eSCAN and Personal Scanner 2000

Tecmar's eSCAN and Electronic Information Technology's Personal Scanner 2000 are essentially the same machine. There are some minor differences, mostly in the menu structures (eSCAN uses function keys, PS 2000 uses numeric keys), but the hardware is identical. EIT manufactures the scanner and sells it to Tecmar.

The eSCAN and PS 2000 are low-cost systems that offer both text and graphics scanning capabilities. Neither system sup-post image: "Balforning" (a way of reproducing gray tones), although EIT representatives suggested that halfforning be available in a later software release. The act of halfornes is estrictive if you plan class of halfornes is estrictive if you plan your graphics is black-and-while line ar little charts, diagrams, schematics, and drawings, you'll find appealing features in these systems.

HARDWARE Generally, text and graphics scanners use one of two methods to capture a page. Some systems transport paper past a window that illuminates the limited for it of the charged coupled ties over a fixed scanning bed. Both methods require precise mechanical loterances, particularly for text scanning, where a listed error per line can trigger a whole

The eSCAÑ and PS 2000 hardware uses a unique design that has only one moving part. The scanning bod and optics are positioned at right angles to one another, with a small mirror mounted at the common perpendicular. A page is placed on the curved scanning bod and illuminate with two non-lights. The mirror pivos devil two most lights. The mirror pivos with the properties of the properties

page of unrecognized characters

Single sheets up to 8% by 14 inches long must be placed facedown, headfirst into a guide at the front of the machine. Page orientation is entired for optical character recognition; graphics can be scanned using other orientations, but you have to edit and rotate them before they print correctly. The curved scanning bed does not easily accept books or magazines for image scanning, even with the removable cover; you're better off photocopying the desired page, or removing the binding and desired page, or removing the binding and

scanning it as a single sheet.

The contrast control on the front panel tels you make adjustments for light or dark copy. Tecrmar's documentation doesn't give you much guidance on contrast control to may man to adjust the Contrast Control the manual gives no concrete examples except to recommend that you use higher numbers to scan lighter images and lower numbers to scan darker images. You must exceptine to see what works for you.

SOFTWARE Both the eSCAN and the PS 2000 use menus to direct users to specific areas. The eSCAN menu selections are made using function keys; the PS 2000 selections are made by typing a number and pressing Enter. The Eac key takes you back one menu level and also exist the program. If you are two menus deep and you hit Esc three times, you'll find yourself at the DOS prompt.

The main menu lets you select graphies sean, text scan, text and graphies merge, file directory, utilities, text and communications, and graphies cell. The utility menu has options for defining the command name and pathname for the word processors, graphies cellions, and communications and pathname for the word processors, graphies cellions to work within the menus also graphics cellion to work within the menus affect of the command that the processor, since the text/graphies merge software works best within the menu systomare works best within the menu systomare.





Left: the version of Tecmar's ECAN that the company was shipping at press time. The new version of the eSCAN will look exactly like Electric Information Technology's Personal Scamere 2000 (right). The PS 2000's unique design has only one moving part, making scamning a practically foolproof process for single sheets. It's more difficult to scan a page from a book or magazine.

tem. Having defined both a graphics and text editor, you can easily scan, edit, and print text, graphics, or a combination, without ever leaving the menus.

The eSCAN and the PS 2000 allow elaborate color editing in their setup menus. You can select from a full range of colors for foreground, background, border, titles, and menu entries. When I tried selecting colors, I noticed that the main menu aways remuned to its original color, white on black, while submenus displayed the colors I selected.

the colors I selected.

The disprosition must be you test the
The disprosition must be not light in
the scanner on or off, turn the mirror motor
on or off, and place the mirror in the
"home position." This mean might be
"home position." This mean might be
roome useful if it had a few messages reporting hardware status, such as "No response from scanner—Check hardware"
or "Mirror not in home position—press
or "Mirror not in born position—press
that some crow messages flash on-screen
for less than a second, which is more irritating than on nessage at all.

INSTALLATION You must install a short-sloi interface and to connect your PC to the eSCAN or PS 2000. The interface and has eight DIP switches that let you set the hardware hex address. However, with TE came? a documentation I couldn't let! if my board was set up cortectly—the book states that DIP switches are on when the dots are down, but my board was the properties of the properties of

Software installation is straightforward; the INSTALL BAT file creates a subdirectory on the hard disk, copies the software into it, and displays a hurdware software into it, and displays a hurdware line frequency, default colors. default for recognition files, and hardware defaults in the setup mode. The eSCAM and PS 2000 support the XT, AT. Compas, and true compatibles. The support for video boards support for the proper for video boards partially and the support for video boards partially and the support for video boards partially and the support for video boards partially support for support for support fined used list May starphics proport includes list May starphics princip over a fixed scanning element, or the scanning element is a page, both of which have their respective advantages and di most common method is to move the page through a paper path and increment lines for scanning.

Once an area is ready to

be scanned, it is illuminated by low-required, interest would be required. The dark areas absorb the light while the light areas reflect it. It is the reflected light that is focused, collismated, and then aimed at a photodiode array or CCDs (Charges Coupled Devices of light and dark into binary data (De and 18).

From that point on the data manipulation for characters or graphics is very different. Aith most DDRs, the characters are at a time and isolated, character by character, into frames ranging from 24 by 40 pixels up to 30 y0 pixels. The individual frames are stored recognition processing.



Atlantestante observational line bys. We job seem tendestonal line bys. We job seem (ounter a large level) and the companion line by the companion line in the companion line in the companion line in the companion line in the companion of the line years a label maintain to Lang these see hang fromhly priored p

The most common method is called matrix matching, where frames of scanned characters are compared against a t characters until a successful match is found. Each manufact this method in a number of ways to speed up processing, but

Like most of the scanners reviewed here, the Tecmar eSCAN/EIT Personal Scanner 2000 lets you merge text with graphics. This capability is especially useful for desktop publishing applications.

Epson's RX, FX, or LQ printers; the QMS Laserprinter; and Hewlett-Packard's Laserjet Plus. The hardware setup menu writes a file called HARDWARE.DAT that you can modify if you change your system.

The last step in installing the software is scanner calibration. Although the HARDWARE.DAT file contains certain default information, you need to run the calibration routine to synchronize the mirror and related scanner hardware with the clock speed on your system. You scan a

special calibration sheet, which is a series of horizontal lines that the software uses to check the mirror. You can scan images without calibration, but the OCR software needs this information to scan text accurately for recognition. You run calibration only once unless you change systems.

GRAPHICS SCANNING I scanned the samples on both the eSCAN and PS 2000 with little difficulty. After positioning the page, I selected the Process Graphic Image menu. The submenu allows selection of

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PRINCETON"

GRAPHIC SYSTEMS

scanning parameters, such as scaling, resolution, and image position. Once you define those parameters, you select Scan, enter a filename, and wait for a minute while the system starts scanning (you can hear the mirror move into position and rotate). In a few seconds the screen begins to display a portion of the graphic. After a few minutes, depending on the size of the picture, eSCAN beeps to indicate the scan is finished (an on-screen message would be more helpful). Pressing Ctrl-Alt-F1 displays the scanned image. Pressing the Space bar toggles the black/white areas (positive or negative image). My first sample (the 18th-century etching) took 3 minutes to scan completely; the second sample (a group of line drawings) took only 2 min-

The maximum resolution is 240 by 240 by 240 pixels per incl, which is show average for scanners. Although this resolution matches the Epson printer at its highest density, it is lower than the output resolution of most laser printers (200 pixels per inch.) But matching this scanning resolution is important if you plan on publishing with a laser printer, so the eSCAN and PS 2000 fall short of the mark here.

Scanned files are stored in SIF (scanned mage file) format when you first scan them. The SIF format is not compressed: the 18th-century etching, with all its detail, took up 263K worth of space. Once you have edited an .SIF file and are satisfied with it, you can compress it into DIF (display image file) format for display and PIF (print image file) format for printing.

The DIF format follows the Group 3 (CCITT) facsimile compression standard.



SCANNERS IN DESKTOP PUBLISHING

A scanner can be an indispensable link in the desktop publishing chain, allowing users to merge complex images into their reports and newsletters.

One of the fastest-growing applications for scanners may well be the desktop publishing market, which some observers have predicted will be a multibillion-dollar industry by 1990. In its highest form, desktop publishing is the production of fully composed page layouts-including typeset text and graphic images-using a personal computer, nage composition software, and a highresolution output device like a typesetter or a laser printer. Ideally, you can merge text and scanned images on the same page, preview the page on-screen, and print it directly to a laser printer, cameraready for reproduction.

Scanners have not played a major role in this process, but that's likely to change. For one thing, the price of the scanning hardware. like the price of high-resolution laser printers, is falling into the affordable range. This year, you can spend under \$3,000 for a scanner that can perform some of the same feats as equipment that cost over \$30,000 2 years ago. Scanning lets you incorporate morecomplex graphics into your published pages. Users who already work with PC Paint or PC Paintbrush know that some images-complex logos or fine illustrations, for instance-take hours to re-create on-screen; these same images take only a few minutes to scan. In-house

newsletter departments that now pay high prices for halflones of photographs of new and promoted employees will find that 300-dot-per-inch scanned images are an acceptable alternative. In either case, the low cost of the new scanners makes the purchase easy to justify.

Professional graphic artists, photographers, and printers consider scanned images inferior to traditional halflones, even when the images are printed on a 300-dpi laser printer. For many desktop bulbishing applications, however, the quality is adequate. Lots of people already use low-cost scanners with the Apple Macintosh, pulling scanned images onto page layouts, merging them with years of the property of the

Desktop publishers who are willing to scarifice true halftone quality in exchange for on-line image access and inhouse control of production will happily invest in low-end saming devices. These pioneers will be able to produce simple images for their newsletters and illustrated documents with fittle effort. Once software developers are convinced will have access to all the software and printer drivers required for integrated desktop sublishing on the PC—S. Venil

This is not a coincidence: EIT and Tecmar plan to announce fax software that can send or receive facsimile images. The communications option in the men is obviously designed to accommodate fax now, but I suspect the new software will make the most of this menu option. One advantage of fax software is obvious: a PC without a scanner can receive graphics im-

ages for editing or merging with text.

DIF and PIF files are created in the Graphic Processing submenu. You can

specify a horizontal scaling factor from .1 to 2.5 times original size and a vertical scaling factor from .1 to 2.0 times original size. You can also shift the position of the image in the file in tenths of an inch from 0.0 to 5.0 (too and left marein).

It took 5 minutes each to create a .DIF and .PIF file of the tething; surprisingly, it took just as long to create the .DIF and .PIF files for the second sample. Having created all these files, I discovered that the .DIF files were useful for displaying im-

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Harddalladlaadladdaladdaladdalladda

ages quickly, creating composite (overlay) images, and odificing—but you can't print them. Similarly, the PIF files can be printed, but they cannot be edited. Furthermore, compression only goes one way. SIF to DIF or PIF format. There is no DIF-to-PIF conversion, so if you edit the .DIF file you can't print it unless you under the print utility in your graphics editor. Since it is not print to the print utility in your graphics editor. Since it will be print utility in your graphics editor. Since graphics with text, I wasn't sure what advantage the DIF and PIF formats offered.

GRAPHICS EDITING YOu must punchase a separate graphics editing program for the eSCAN and FS 2000. Although there is a module called the Extended Graphics. Editor, this option has no editing capability. Its primary purpose is to display files in compressed (DIF) and uncorapressed (SIF) modes and to servall and position a portion of the image for editing. Once you select an area, you must use a third-party editor to grab the screen. These to the property of the property of the proting of the property of the property of the DF, HALO II and Zooft's PC Painthrash, two of the more popular paint programs for the PC.

The documentation on this subject is sparse or nonexistent. Tecnar provides exactly three brief paragraphs on the necessary steps for editing an image in the Extended Graphics Editor grab screen, call editor, replace edited portion with Ctrl-Alt-F2. The rest, it seems, is up to you. For example, the manual doesn't mention that you should add the necessary screen-grab-

bing commands to your AUTO-EXEC.BAT files before you try to edit a file (also, a sample of the necessary steps would have been nice).

■ The best feature of the eSCAN and PS 2000 software is its learning mode. Using OCR

diagnostics, you can teach the software to recognize an unfamiliar font.

If you use an SIF file, you can edit only a portion of the screen, if you edit. DIF files, you can usually grat be entire screen, it is not clear whether you can create a blank. SIF found add graphics to it can be suffered to the properties of this. Editing is straightforward: I added up some fuzzy areas near the compositor's hand. One area of the line drawing hand. One area of the line drawing hand, and the same fuzzy areas near the compositor's hand. One area of the line drawing hand, and the same could not be easily repaired. In this area could not be easily repaired, in this area could not be easily repaired. In the same could not be easily repaired. In dight cleanup, major surgery should be handled with care.

TEXT SCANNING Before scanning, you set OCR options for such factors as font, lines per inch, page size, and scanning margins. You can scan and recognize in one step or scan the text and run the recognition software later. I liked the teconophion best because at times! I wanted to get the pages into the system and fuse with the files later (using the actual pages for reference). I used both methods on the sample pages.

When I scanned first and recognized later, it took less than 5 seconds to scan each page, but recognition went much slower; 50 seconds for the first page and 40 seconds for the second. In the scan-andrecognize mode, the first page took 60 seconds and the second took 53 seconds. Both

the Tecmar and EIT software had some difficulty with my Courier font: on the first page it didn't recognize 11 characters and on the second page, 9.

Text can be used as is or edited within the OCR subment. Editing, or previewing, let's you go through the recognized file and search for uncertain character (highlighted) or uncroognized-character Hughlighted) or uncroognized-character Augustion mark). You enter the correct character as you edit. You can also disable all flags and use a spelling checker, which may be easier on longer text files. It took only a few minutes to edit both files.

The standard file format is ASCII text with CR/LF for line endings. You can use this file, or format the text for your word processor. You can format the text automatically during recognition or in a separate step within the menu. You select a file format (a generic file, PFS:Write, Volkswriter, WordPerfect, or WordStar). preview a text file, then press F4 to save the file in the output format selected. For my sample files I selected automatic WordStar formatting. Paragraphs, tabs, and centering came out correctly, although the decimal-aligned tabs wandered a bit (redefining the tab in WordStar's ruler solved the problem). The underlining was lost and had to be added to the file.

The best feature of the cSCAN and FS 2000 OCR software is its learning mode. Using OCR diagnostics, you can teach the software to recognize an unfamiliar fort or software to recognize an unfamiliar fort or software to recognize an unfamiliar fort or some software to recognize an unfamiliar forth or some software to recognize an unfamiliar forth or some software to recognize the season for the software to recognize the software for the software

OCR diagnostics displays an unrecognized character next to a reference character. You can shift the character cell until the unrecognized character is isolated, then grab the character for inclusion in the font file. For example, the lowerease i in we example uses much thicker than in the reference font. After I added the thicker character to the Courier IO fort file, the software could compare two versions of the i character—mine and its own—and



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In Short: The Personal Scanner 2000 comber text and graphics scanning and let you more graphics with scanned text or word processing files. Menu-driven software provides color editing capabilities for graphics and a learning model lets you seach the sciences new fores.

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recognize either one. There are limits to the number of characters you can add to an existing font before performance is described in the service of the compared to the compa

MERGING TEXT AND GRAPHICS
FILES You merge text with graphics by
creating a text file and adding an index
mark and the .SIF filename. The first does sets the upper-left-hand corner of the
graphic, the number of the graphic, and the
filename. The second index sets the lowerright-hand corner. The urea between these
two indexes must be blank, but, you can

add text anywhere else outside of it. You can scale graphics within the text file by adjusting the position of the indexes. For example, the file directory showed that the etching was 81 characters wide and 64 lines long; when I placed my first index at line I, column I, and the second at line 32, column 40, the software automatically reduced and printed the graphic at half size. You can also enlarge graphics by reversing the procedure. You can place one graphic on top of another, hiding a portion of the first graphic, or you can overprint the two images using a special index mark. The indexes do not crop graphics, so unless you edit the image you must use the entire file.

mand use the element less. On merge graphics. If you want to former text using a word processor, you man print to a disk output file. I had defined Wordshar as the callable editor in the menu utility, which mande it easy to move be-unity, which made it easy to move be-unerse. The preview feature shows an other of the regions and the SIF fleatures where the graphics will appear within the text, but not the actual image, so it has limited use. Printing takes anywhere from 10 sets, that to the actual image, so it has limited use. Printing takes anywhere from 10 sets of the graphics which graphics the complexity of the graphic.

I used two reduced versions of the sample with a few lines of text, which took IT minutes each to print. The full-size version of the etching took a full 15 minutes. I noticed that the text line spacing was altered in these merged files. The first few lines printed close together, then were spaced farther apart once the graphic was introduced. After several attempts I discovered that this was always the case and that I could not alter it. I checked the text file for stray line-spacing codes, but there were

The eSCAN and PS 2000 systems have a number of good points. The hardware should be easy to maintain since it has only one moving part, and the calibration program ensures that it will work on most compatibles. The software's menu structure is easy to use and allows customization for callable programs on the hard disk. Scanning resolution is good, and the OCR's learning mode makes it particularly versatile. My few reservations concern the lack of halftoning capability in the graphics scanning software and the lack of an integrated graphics editing program. You have to purchase a separate program and deal with poor documentation, but graphics editing works rather well once you've installed it. Overall, these are good, reasonably priced general-purpose scanners with some excellent OCR features.-Tom Stanton

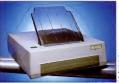
Microtek MS 300A Microtek Labs' MS 300A, a 300-dot-periorh image scanner, offers three graphics

inch image scanner, offers three graphics scanning modes: line art, halftone, and mixed. You can adjust contrast and brightness control settings in 14 steps on each scale. The scanner's hardware can also be used to scan text, in conjunction with software available from OCR Systems at extra cost. HARDWARE The 18-pound Microede MS 300A has a streamlined appearance—it's 44% inches high by 15 inches wide by 17 inches doe; Only two small status lights ornament the top, indicating "power on" and "ready." The definant scanning framer size is 8½ by 11 inches, but you can on" and "ready." The definant scanning framer size is 8½ by 11 inches, but you can see any one of the scann an image as any large as 8½ by 14 inches or as small as 4½ inches square on a minimum paper size of 3 inches by 3 inches. The image sensor is a linear army charged could device with 300-by 300-by iresolated device with 300-by 300-by iresolated.

The paper guide, required for feeding one sheet at a time through he rollers, stands upright on the top of the scanner, and pages are ejected through a door on the front. The paper path takes each sheet straight across rollers from top to bottom. If the paper jams, you must remove the roller assembly from behind the exit door to get the sheet out. It's possible, then, to free a jam, but certainly more-direct access would be preferable.

OCR software from third-party manufacturers such as OCR systems can access scanned data through the MS 300 A's TIL. compatible parallel interface in two ways. through a "mailbox" type channel or through a high-speed direct memory access (DMA) channel. The optional serial interface operates at 9,000 to 57,600 bits per second and supports both RS-232C both RS-232C bits. Maximum scanning speed is 9.9 seconds for an 8½-by 11-inch document using DMA transfer.

INSTALLATION Installing the MS 300A is simple enough. You insert the parallel interface card supplied with the scan-



Microtek Labs' MS 300A has a streamlined, printerlike appearance. Pages are fed in one at a time using the paper guide on top of the scuther.





EyeStar software handles the MS 300A's scanning functions. This screen shows the scanned image as well as the scanning menu, which lets you adjust for contrast and brightness.

ner into an expansion slot in the PC and run the installation program. (The scanner can connect to a serial port as well, but we did not test this option.) You may also need to run a utility to configure the system if you don't have the default setup; a 300-dpi scanner (Microtek also makes 200-dpi machines), a Hercules graphics card, and a Hewlett-Packard Laserjet or Laserjet Plus. If you use a Corona LP300 Laser Printer. you must load the LP300 driver (supplied by Corona) into RAM before starting up EveStar, the graphics scanning software that comes with the MS 300A. Also, a mouse installation program makes a VisiOn PC mouse model M-1 or M-2 available as an alternative to the cursor movement keys.

The manual recommends that you overnied DOS's normal limit of no more than 8 files open at a time by using the FILES command to set the limit up to 20 files. EyeStar lets you retrieve as many as nine different scanned images at a time and merge them with an EyeStar text file—a procedure that requires 10 files to be open simultaneously in addition to the program and DOS files.

The scanner comes with a technical manual for the hardware and a well-illustrated user's guide for the scanning software. Although the software works well and is easy to learn, the manuals themselves have plenty of room for improvement. For starters, Microtek could include such basics as an index and running heads.

SOFTWARE Because many scanned images require more storage space than a floppy disk can accommodate, you need to run EyeStar on a hard disk system. The manual recommends that you work with at least 1,056k bytes of free disk space, and preferably more than 1,572K. As mentioned before, you can merge up to nine image files with text if you set FILES=20 in your CONFIG.SYS file.

The program includes a conversion utility for its graphies files that lets you convert EveStar files to and from GEM Paint. The disk also includes printer drivers for the Epson PX series of dot matrix printers, as well as such laser printers as the Corona LP300, the Canon LBP-8 A2, and the Hewlett-Packard Laser/jot to Laserje flevior to Laserje flevior

OCR, a text scanning program from OCR Systems, turns the MS 300A into an ontical character reader (the Canon scanner also uses OCR). The system requires at least 384K bytes of RAM to run OCR (less than image scanning requires), but 640K is still preferred. A graphics card is not required, however. Like Palantir, OCR Systems uses the pretrained topological analysis approach in reading characters (an approach considered superior to either matrix matching or user-trainable topological systems) and adds contextual analysis to correctly distinguish numbers from letters of the alphabet. OCR is unique in that it is not sensitive to size and can accurately read type that has been reduced or enlarged.

The OCR disk includes FORAD (Format Adapter), a memory-resident utility for converting scanned text into Mulri-Mate, DisplayWrite, WordStar 2000, CanoWriter II Plus, PC-Write, Symphony, and other word processing program formats. (WordStar and WordPerfect can accept the ASCII files as scanned without further conversion through FORAD.)

(You can purchase *OCR* directly from OCR Systems Inc., 3430 Progress Dr., Suite I, Bensalem, PA 19020; (215) 638-2174. The price is \$495.)

TEXT SCANNING We tested the Microtek scanner and the OCR software on a Compaq Plus with 640K bytes of RAM, using WordStar to display the OCR results. The OCR menu options, such as adjustments for image darkness and paper size, are selected by function keys. The MS 300A read the price list accurately, although the tabs did not align properly. It also scanned the Courier portion of the letter perfectly the first time but introduced two typos on the second reading of the same sheet. On both readings, some lines that should have been flush left appeared with a space at the beginning, and some characters that were overwritten by the handwritten signature on the letter were misinterpreted by the reader. We were surprised to see that the scanner read parts of the typeset letterhead, though not with enough accuracy to make it feasible for extensive use in reading small, proportionally spaced text. It took 1 minute and 6 sec-

onds to scan a full 81/2- by 11-inch page.

When scanning a page of proportionally spaced type (Bigelow and Holmes's Lucida face), the software read the book-



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List Price: \$2,500 (text scanning software not included) Requires: 256K RAM, hard disk, Hercules monochrome graphics card or color/graphics

monochrome graphacs card or color/graphacs adapter.

In Short: A streamlined graphics scanner that specializes in halflone and line-art scanning. Good compatible text-canning software is available from a third-party supplier. Text and graphics can be merged and the results used in desidor outblishing arcelications.

but the number of supported printers and typefaces is limited. CRCLE 675 ON READER SERVICE CARD



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TAKE IT TO THE LIMIT

How far can you push a scanner before you discover its limits? Tom Stanton tested Tecmar's eSCAN and the Datacopy 730 to find out.

The artwork samples with which we tested the scanners, while challenging, were not of particularly poor quality, nor did they have any continuous tones. So I wondered what would happen if I stopped playing by the rules and threw two machines the most-difficult examples I could find.

eSCAN Since Tecman's eSCAN does a good job of scanning a wide variety of pictures, as long as they are black-andwhite line drawings (like graphs, charts, and schematics), I tried scanning several photographs. A plain black-and-white photograph tends to look solarized because eSCAN cannot resolve the endless shades of gray. The result is a kind of silhouete of the darkest and listness areas.

However, a photocopy of a photograph scans a little better. It seems that the photocopier fills in what the scanner rejects or interprets as black or white, and the scattered toner acts as a kind of mock halftone. Since the scanner can easily pick up small black dots of toner, by adjusting the contrast on the scanner (if possible) you can manipulate image quality. This process requires experimentation and may not work on every photo.

DATACOPY 730 The Datacopy 730's halftoning capability is remarkable. After this machine scanned my test pages. I

weight serif font perfectly but erred often when reading bold, italic, or sans serif text.

GRAPHICS SCANNING To scan graphics, we loaded the disk files from the greyer factor of the far disk and installed the program, then started disk and installed the program, then started it by typing ISTAR and hitting Return. The opening screen shows a rectangular mage area on the left and the four main menu options on the right. Scan Image, Process image, Mix Feet and Image, and

threw it everything I could find: blackand-white photographs, color photographs, blurry family photos, magazine ads, and a collage of all of these. I am happy to report that the 730 did not choke on any of them, although you may have to experiment with contrast control to get

color photos to scan correctly. Black-and-white photographs or reproductions yield the best results. The scanned output resembles a sketch with highlighting produced by stippling. The 730's halftoning process is actually more a conversion from continous tone to line art. Gray tones in the middle range (30 to 70 percent) pose the greatest challenge, but the 730 usually makes the right choice. Color photographs are harder, and predicting the result is not always easy. In general, color photos scan with more blacks and darker grays, but the outcome depends on the quality and intensity of the color. For example, color photos of my family were generally darker and scanned with more blacks and dark grays. Commercial photographs. where colors are more intense and contrasts are sharper, showed a much wider range of grays, particularly if they included lighter shades. Since the 730 allows you to do multiple scans before committing an image to disk, it is easy to experiment and find the closest possible match.-Tom Stanton

User-Defined Functions.

The Scan Image option leads to a submenu on which you can set contrast, brightness, scale (25 to 100 percent in 16 steps), grain (number of gray levels), and mode (halfone or line art). Through this submenu you also set the paper length, frame (area to be scanned on the paper), and windows top to four areas within the frame, which will be scanned in the secondary mode). The windows feature is useful when you scan a page that includes a photograph of the proper place and the proper place and the property of the property o

text on a white background, for instance. You could select halftone mode for the photograph and line-art mode for the text—but the text would then be scanned as a bit-mapped image, not as ASCII characters.

Once you've selected all your options, you can save the settings to use on other scans. You can also scan and print the image before editing it—even before saving the scan or the settings—all through the Scan Image submenu.

To save the scanned image itself, you exit the Scan Image menu set and go to the Process Image option of the main menu. You can save the image exactly as scanned, or you can use EveStar's imageediting features to alter the image by cutting away or copying part of the image and pasting it elsewhere, rotating a selected part of the image 90 degrees left or right, turning it upside down, flipping it from top to bottom or left to right, and reversing all or part of the image's black-and-white areas. You can use the paint function of the Process Image submenu to draw lines in 1 I different thicknesses; the paint function also lets you draw boxes and fill them with 16 different patterns. A zoom option lets

you zero in and work on small details. You can conserve disk space by saving scans in compressed mode. This mode will have no effect on the size or quality of the image itself. Compression is most useful with images scanned as line art, while complex halftone images will not shrink significantly. Our test image required over 600K bytes in noncompressed mode and about half that in compressed mode.

An image can be loaded into the Process Image window exactly as saved, resized proportionally, distorted (that is, resized nonproportionally), cropped to fit in the window, or merged with another image in the current window to create new images.

INTEGRATION The main menu's Mix Text and Image option lets you set HASCII flies that can merge text with as many as nine different scanned images. You can type the text directly into EyeStar or print WordStar flies through EyeStar. By typing in text and merge commands in an ASCII file and printing it through EyeMar. you can merge text and graphics



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on the printed page in almost any layout text above, below, beside, or printed on top of the graphic in black or in reverse (white type on a dark background). However, in practice many trial printous would be required to produce a complicated layout, since you can't preview the merged text and graphics on the screen.

The range of typefaces, styles, and sizes varies depending on the printer you are using. On the Corona LP200, Evebus 200, 100 the Corona LP200, Evebus of a sans serif fom. On the Epson Fx-100 it supports the traditional Picts upper before face, a condensed face, and two large type styles for headings and titles. On the 100 t

The MS 300A's relatively low price and sophisticated graphics capabilities make it an attractive candidate for users host already have a need for scanned line at or halftone images. Although it is possible and the state of the

source. Secreptines of only one shoet at a time and its problems with reading tabbed in the problems with reading tabbed with other scanners are drawback for those who wish to use CCR Systems. Seccellent software with the Microcke bardware for scanning long documents, but the Ore/RMS 300.4 combination is still useful for saving keying time on shorter documents. We expect OCR Systems, too, to say in the forefront of scanning technology — Daine Durns and S. Ventil

PC SCAN

Dest Corp, was one of the first companies to recognize the need for reasonably priced, PC-compatible OCRs. The Dest 212 was an excellent general-purpose OCR, featuring an automatic sheet feeder, a scanning drum that opened clamshell-style to clear paper jams, simple two-but-



Dest Corp.'s PC Scan can fit neatly between your system unit and monitor. It currently scans only text, but graphics capabilities are in the works.

ton operation, and a standard serial interface. The Text Pac software allowed simple ASCII transfer or custom formatting for popular word processing programs and recognized most popular typewriter faces. (See "Midrange OCRs: Reliable and Reasonably Priced," PC Magazine, Volume 4 Number 14.)

Now Dest has added new OCR hardware to its stable. The PC Scan was built to be used as a true PC peripheral rather than as a special-purpose machine like the 212. The new Test Par software designed to complement the PC Scan represents a significant change in the human/OCR interface. Overall, the PC Scan persens a signature of the promising, albeit with some room for improvement.

THE HARDWARE While the Des 212 to too over most of ackstop, the PC S212 to too over most of ackstop, the PC S212 to too over most of ackstop, the PC seems and II b's inche so light, I of inches wide, or and II b's inche cheep. The document of the shows the scanner (which can support up to 30 pounds) stacked between a PC system unit and monitor. There is a I b's-ine ded stor in the form and a status-light paniel to the left, but no buttons. Text Pac soft-ware handles all the scanning function. This is the scanning function. This is the smallest automatic scanner I've see the

The illuminated display panel in front has five icon indicators for power, wait, ready, paper jam, and service. A numeric LED displays status codes that are explained in the documentation. The status codes guide users through specific problems and their resolutions. The rear panel has a power switch, a 50-pin cable connector, and a mysterious 9-pin connector that is not mentioned in the documentation.

The PC Scan accepts pages from 3½ by 3½ inches up to 8½ by 14 inches. Each page must be fed by hand through a semicircular paper path, with scanning lighs and optics hidden behind the from panel. Scanned pages are ejected at the bottom; since there's no hopper, you have to catch them before they hit the desk or the floor. The handfeeding and -catching can get very tedious if you have a lot of pages to scan, but for the occasional batch, it's mobably sufficient.

There is no way to open up the PC Scan to clear a paper jam, which could be a distinct disadvantage if you are working under pressure. Dest must have incredible faith in the integrity of the paper path, but I can eastly imagine a piece of paper getting hopelessly jammed inside, which would require a service call from Dest. The lack of a mechanism to clear the puper path is one flaw in an otherwise superb hardware design.

INSTALLATION Unlike the Dest 212, which used a standard serial port, the PC Scan works with a special interface card.



scanner may be too slow for large scanning applications.

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Using a slot isn't so bad—but the threequarter-length card could easily have been designed as a half-card to fit in a short slot (all that empty space and the 9-pin connector suggest that Dest has some future expansion in mind).

Six jumper blocks on the card let you set the direct memory access channels (1 or 3), interrupt level (3 or 4), and hex address of the 10 port. The jumper-block documentation is complete, easy to understand, or the control of the installation. In most cases the factory settings will be correct, and you will be able to ignore the jumper blocks. If you have expansion cards that use the same addresses, the PCS can will fail its diagnostics and you will have of electrinic the different cards of the control of the c

Once you install the interface card, you connect it to the PC Scan with a 50-connector cable. Plug in the PC Scan, turn it on, and you're ready. The initial power-up diagnostics will display an error condition until you install the Text Pac software.

Text Pac can be installed on a hard disk or on two floppy disks. The software installation takes just a few minutes and is essentially a copy-initialization procedure that places Text Pac on a bootable disk (hard or otherwise). Once you install the software, you are ready to run the PC Scan

SOFTWARE Text Pac runs in two modes: full-operation mode, which you use when your word processor does not require that you reboot the system to run it, and limited-operation mode, in which Text Pac must be loaded after a reboot. To understand why there are two modes, it is important to know how Text Pac works.

Most OCR software is self-contained: it sets up communications, handles font recognition, and inserts format codes within its own environment. You must leave the OCR software and run word processing software to edit the output file. Thus it makes little difference whether or not you reboot.

Text Pac is entirely different. Once the software is loaded, it stays resident in memory. To run it you call up your word processor and press a "hot key" (the default is Alt-S). A window pops up on-





The PC Scan's Text Pac software lets you scan in new text while working in your word processor. Top: in full operation mode with the RAM-resident Text Pac program loaded, you can pop up a scanning window during a WordStus secsion. Bottom: Text Pac's main menu gives you access to help files and ollows you to quit to DOS.

screen, prompting you to load a page. PC Scan then scans the page, recognizes the characters, formats the text, and places the output in the word processor file. You can press Alt-S while you're editing a file, scan in new text, then resume editing, all without leaving your word processor. This is its full-operation mode.

disk or a floppy disk system, you simply create installation disks. If you must reboot the system to run your word processor, you must store part of the Text Pac software either on the system disk or in the word processing subdirectory. This is Text Pac's limited mode, and it requires at least 21K bytes of free space. You must copy the remaining software onto two disks and

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load it when the system prompts you.

When you install Text Pac the software asks if you changed the hardware configuration (DMA, interrupts, or hex addresses); if you have, you must enter the new values. Once you've copied the necessary files onto a working disk or a hard disk. you are free to change parameters as needed. For example, you can specify the default word processing program (Text Pac supports DisplayWrite 3, MultiMate, WordStar, WordStar 2000, and a universal word processing formatter), although you can change this at any time once Text Pac is installed. You can also change the default format parameters or the Alt key sequence that calls up Text Pac.

The manual contains specific instructions for using Text Pac and the PC Scan with each of the supported word processors. In some cases (like Displawfire), you must modify. BAT files before you start scanning. Most word processors don't require file modification, but it is useful to read the relevant sections to understand how Text Pac formas files.

Text Pac recognizes the standard range of monospace froms (Courier, Eilite, Letter Gothic, Prestige, Pica, OCRA, and OCRB) and proportional monospace following (Bold, Cubic, Madeline, and Title). The Dest documentation includes a two-page list of the type style is tupopris, four additional pages illustrate the type styles for comparison.

Dest, like most manufacturers, does not support dot matrix fronts. A spokesport of or partic, fronts. A spokesport of or Dest told me that the next version of for Dest told me that the next version of Fort Pee will support fronts produced on Epionn, Okidans, Star Micronics, Hewlether Peakard Thinklet, and IBM PC grapher printers. High time, too—so many kinds of texts are printerd with these forts that a vonder how Dest or any of the other OCR manufacturers expect their machines to gain widespread use when they cannot scan the simplest font.

OPERATION To test the PC Scan and Text Pac software, I used my installation disk to load Text Pac software, entered the menu to select WordStar formatting, and then quit the menu to load WordStar (Version 3.3). After creating a file called PC_TEST_TXT, I pressed Alt-S to start scanning. Text Pac prompted me to insert.

THE FAX ABOUT IMAGE SCANNING

PCs equipped with fax software can now communicate with those ubiquitous facsimile transmission machines.

I claw my first facsimile (or fax) mafine in 1963 when I took a tour of the Chicago Sun-Times. Our guide stopped near the glass-walled Telex office and pointed out a fax as it was printing a sports photo from Los Angeles. I was annazed to think that someone could feed a photo into a machine in L.A. and it would arrive in Chicago a few minutes later.

In the old days, only wire services. the government, and the Fortune 100 could afford to send images point-topoint along Telex lines. Two factors made fax affordable in the 1970s; the 1967 Carterphone ruling by the FCC, which made it legal to attach peripherals to telephone lines, and Japanese scanning technology. The Japanese had one important impetus for developing scanning technology: their language. Word processors have a hard enough time with the numerous Japanese ideograms; developing equivalent optical character reader capability should merit a Nobel prize. However, image scanning is well suited to transmitting the Japanese language, so they have invested a great deal of work in this area.

Today, over 800,000 dedicated fax systems are installed in the United States, and a growing number of PCs have fax capability. EIT's Personal Scanner 2000 and Tecmar's eSCAN offer special fax

a page, and the hardware immediately began feeding and scanning the page.

It took a minute for Teat Pac to work as the letterhead, after which it scanned and recognized the monospaced characters in under 49 occolost. The price list, which had only monospace characters, took only 30 seconds to sean and recognized. The letter had only three unrecognized characters, when underlined, the words every and by have descenders that touch the underline. The letter was formatted more or less as I

software that allows a PC without a scanner to receive and edit images sent from a fax machine over phone lines. All of the systems reviewed in this issue follow the CCITT (Consultive Committee on International Telephone and Teleptaph) standards for fax transmission compression. The CCITT standards are one reason why fax has remained a popular method

for transferring images.
The CCIT has four group classifications based on the speed of image transinsiston. The first two groups are based
insisted to the speed of the speed of transmission or page in six minutes; Group
2 transmiss one page every 3 minutes.
Group 3 systems, which include most office PCs capitoped with fax software,
transmit one page per minute. This is the
most common fax group standard in use
today; Group 4 masshires, which transtion visit of the speed of the speed of the
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PC-based scanners use data compression algorithms to meet the CCTT stamsission. Most data compression involves eliminating the bits used to represent blank spaces, which often make up over 30 percent of the image data. One common compression method is to use only I bit to represent 4 bits of an image. The compressed file can be transmitted and then expanded at the receiving end.—Tom Stanton

wanted it, although I did have to reformat the third paragraph because WordStar did not wrap the words that contained the unrecognized characters.

The price list didn't format correctly at first; the tabbed text was scattered all over the page. A call to Dest's customer support revealed the problem: before you scan tabbed text, you should change the default WordStar ruler so that it is wider than the text you want to scan. This strategic tip isn't mentioned anowhere in the document.

tation, but it should figure prominently.

Text Pec scams a page; determines the left margin, task, and right margin; and then embeds a ruler before dumping the text into the word processor. The documentation describ tell you that the Text latter late (15 columns). In my case, Text Pac tried to embed a ruler but was overridfail of the Columns, and the constant what I did. Once I changed the WordStart what I did. Once I changed the WordStart ruler to St columns, Text Pac formatted to the columns, Text Pac formatted to decimal tabs. Random seaming of other pages produced coqually successful results.

The concept behind the PC Sean—text scanning as a routine part of word processing—is an interesting one. For example, word processors with totally incompatible file formats can exchange data using the PC Sean and Text Pac software as the conversion utility. With Text Pac Spowers of committing capability and its simple user promoting the purpose of CR seanning. Dest plants to add graphics examing capabilities soon, which will be a welcome improvement.—Tom Stanton

Datacopy 730

The Datacopy 730 is an upgraded version of Datacopy Corp. 's 700 model scanner (see "Scanners at a Glance," *PC Magazine. Volume 4 Number 14). Despite much new competition in the scanning market, the Datacopy 730 remains the premier low-cost scanning for the PC. The addition of text scanning features and enhanced graphics scanning resolution make the Datacopy 730 an even worther competitor.

The 730 resembles a small office copier is 9-by 14-inch flat scanning bed has a flexible cover that can be removed when scanning books or magazines. During a scan, you place pages facedown on the glass and close the cover. A light source and scanning opties move beneath the page during a scan. Operator controls on the front allow you to adjust the light intensity to compensate for the outsilt vol free for the page during a scan. Operator controls on

scanned material.

Like most of the scanners reviewed here, the 730 has a special short-slot infrace card that you must install before you can run the system. The card has two sets of DIP switches, but the documentation doesn't tell you much about them, except the 10 address, space and DMA channel. Since the switches are set by the factory, and in the manual you are enjoined from changing them, I wonder why they are there in the first offace.

You need a hard disk to install Datacopy's scan software and image-file subdirectory. Since a full-page scan image takes up over 500K bytes even when it's compressed, you cannot run the scan software as a standalone application on a floppy disk. (The OCR software and graphics editor can be run as standalones without the WIPS software environment described below, if necessary-for example, if you wanted to run them on a floppy system.) I would recommend a minimum of 10 megabytes for the 730 software and one or two other applications, such as word processing; 20 megabytes is probably more practical, but by no means a necessity. You can also install a mouse for menu control.

The 730 requires a Hercules Monochrome Graphics card or a compatible



The OCR and graphics editor software will run on CGA or EGA cards and can be installed for these cards if you run them as standalone applications. However, make full use of the software environment you need the Hercules card. If your other software doesn't run in a Hercules mode, you will have additional problems bringing it into the 730 environment.

SOFTWARE The Datacopy software, called Word Image Processing System (WIPS), has three component programs: scanning software, a graphics collor, and OCR software. When installed on a hard disk, the WIPS software creates a total computing environment. A menu utility less you define the directory and the command to invoke other programs from with a WIPS, so long as these programs run in a feed telephone of the WIPS program. Seven displays user-defined programs along with the WIPS of t

The Image Processing main menu displays options for image capture, image edit, scan perameters, image-file management (naming, lodding, and saving), and printing. Submenus list additional options, such as merging text and graphies. The menu system is well designed and takes just a few minutes to learn. User one ment keys for a mouse) move a highlighten pressing later coverue here. In Ser-deting bar from liter to learn in the menus, pressing later coverue here. In Ser-dewhile commands are bracketed with lines. The Ess key recalls previous menus up to the WIFS Program Screen.

The scanning software offers a variety of options. You can select scanning resolution (240 or 300 dots per inch), the scanned image size (full page or portions of a page), image scanning utp to 200 percent of the original size), and image compression. One nice feature of WIPS is that it lets you scan, manipulate, cdit, and size an image before saving it permanently to disk. Since



The versatile Datacopy 730 resembles a photocopy machine. This scanner is the only one in its price ronge that reads proportionally spaced text. a full page of uncompressed data takes up over 1 megabyte, the ability to control what you eventually save to disk reduces the amount of time you spend managing hard disk real estate.

WIPS has two image-editing modes:

■ The Datacopy 730's image resolution is excellent on-screen, and the zoom mode can show the minute detail of a portion of the image with even better resolution.

on-screen within the WIPS menu, and the callable WIPS Editor. The on-screen editing mode lets you crase, invert, or rotuse portions of an image defined with a window, this mode is useful if you want to work on large portions. For more control you must use the callable WIPS Editor, a modified version of Zsoft's PC Paintbrach. Like most "paint" programs, the menus, and a variety of brush width, patterns, forsts, and drawing tools for manipulating the image.

The WIPS Editor does take a little getting used to because it uses aspect ratios to make the paint files compatible with WIPS image files. The aspect ratio in the paint program tends to stretch images so that, for example, a square is a tall rectangle and a circle an ellipse. This distortion makes it difficult to judge the effects of an image edit, but unless you plan a major overhaul of the image, it is probably sufficient for most cleanup work. You can also create images with the WIPS Editor by loading and editing a blank image page. You can run the WIPS Editor as a standalone program, but you cannot load any image files you create this way into the WIPS environment.

The WIPS OCR software is simple and effective. If somewhat clumsy in its imple-

mentation. You can set the page size, page contrast, type style, and output filerame from the mem bear at the top of a screen. Three main options (commands, type styles, and settings) are highlighted with cursor movement keys or a mouse; pull-down means dipply the selections in each down means dipply the selections in each town the selection of the selection of

The OCR software has three userselectable modes for dealing with unrecognized characters. You can continue withour marking, in which case the software makes the best gazes, or you can define a una make each one in the file. The nicest opion is stop and mark: when the software encounters a character if doesn't recognize, it pops up a window on-screen showing the word in which the offending character appears, much like a spelling program does. You can edit the word or ignore it at your

InstalLATION Installing the interface card and cable and connecting the 730 take just a few minutes. Your hardware configuration must be 100 percent compatible with the software's requirements, my attempts to load a Hercules emulation mode on a EGA card caused the WIPS software to crash when calling other applications. If you own a compatible, I strongly rou, own a compatible, I strongly roster the system on your machine.

The WIPS Editor and OCR software are copy protected, allowing two installations per hard disk. You can remove protected files from one hard disk and transport them to another system. Software installation is easy enough, but the documentation ignores an important first step: you must install any mouse driver before you run the WIPS installation program. If you simply follow the steps in the installation guide, this fact surfaces only after you have entered the installation command, when it is too late to load the mouse driver. Mercilessly, the guide then asks you if you have installed the mouse driver. Bearing in mind that you are allowed only two hard disk installations, you must answer no, finish the installation, uninstall the pro-

gram, and repeat the procedure.

Once you're over that hurdle, the remaining installation is easy. The Menu Setup option in the WIPS Program Screen lets you define programs that WIPS uses as well as applications that you may want to run from the WIPS menu. You enter the application name, the extension (.COM. .EXE, or .BAT), and the path for each item in the menu. Before you run WIPS, you should modify your AUTOEXEC file and comment out all commands that load memory-resident programs, print-spoolers and RAMdisks included; WIPS uses all the addressable memory for manipulating images. I did not try uninstalling memoryresident programs, but my suspicion is that a simple Ctrl-Alt-Del reboot would be more effective.

OPERATION WIPS is easy to use and at all stancane and displayed the test 17th-century etching in under 2 minutes and the line drawing in just over 1 minute. It achieves this speed in part because WiPS does not write the scanned image to disk until you enter the saven command. I liked its ability to sean, edit, and resean an image until a hethered the destried look before saving the image. Other scanners write to disk as they scan, which takes longer and the same of the same of the speed to the same of the sam

The image resolution is excellent onscreen, and the zoom mode can show the minute detail of a portion of the image



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with even better resolution. After I tested the samples, I scanned a number of other images, including black-and-white photographs and magazine ads (see sidebar 'Take It to the Limit'), and was even more impressed with the 730's capabili-

I scanned the etching several times, first in full screen and then using the WIPS windowing feature. You use the window to position the area to be scanned, although the windowed area into memory. With a little practice you can window any act on a page, which is useful when you need only part of a picture and do not want to manipulsate amegabyte and a half of image little. You can also use the window with zoom in on areas to see if the detail has held up or if you need to edit the image.

Image scaling lets you enlarge the saved image. I tried several ratios to see which one I liked and found that the threquarter size (2 to 1 ratio) looked best and held the detail. Too much reduction may cause tightly spaced lines to blend together; too much enlargement tends to reveal imperfections.

The on-screen editing feature, which also uses the window, could be considered the block mode for editing. Essentially, the country of the window, and the window of the window of the country of the cou

Once I had edited an image I saved it in uncompressed mode: the I 7th-century uncompressed mode: the I 7th-century uterking took I.4 megabytes and the line drawing 850K, MPSF took 3 minused to save the techning and a little over 2 minutes to save the line drawing. A counter too too the display shows you what percenta increments. It takes about the same amount of time to save fless in compared mode, but the file size is smaller. Recalling a file for additional editine takes over a mode.

minute because the file must be loaded into memory.

TEXT SCANNING The OCR process requires two steps: scanning/recognition, then formatting the scanned text file. There are currently ten formatting files for word processing, including IBM's Personal Editor and DisplayWrite,

When the Datacopy
 WIPS software encounters
 an unrecognized
 character, a window pops
 up containing the word

and the character.

MultiMate, Microsoft Word, WordPerfect, WordStar, WordStar 2000, and Volkswriter (the Field Test documentation doesn't specify version numbers). Two other format files convert text line by line or by paragraph.

Its menu structure makes the WIPS CCR software easy to use; you can select foots and settings and start scanning in under a minute. First I defined my unrecognized-character flag (the @character and scanned in the "mark-and-continue" mode, in which unrecognized characters are flagged during precognition. It took 30 seconds to scan and recognize each pages during the recognition phase. I continue to total of ten unrecognized-character flags for both sample pages.

The recognized text on-screen is a distressingly jumbled mass, but formatting the text will restore your faith. From DOS1 selected the WardSar format file and entered the input and output filename. The resulting output file displayed perfectly in WardSar, in both text and tabular format. The table was, unexpectedly, formatted with tab snaces and not hard snaces.

I scanned the text again, using the "stop-and-ask" mode. When the software encounters an unrecognized character, a window pops up containing the word and

the character in a gray-scaled cell. Alleas, that's what the documentation sups—in my experience, the window popped up and displayed the word, but the cell that was supposed to comiain the character was supposed to comiain the character was than "mark and continued". 3 minutes overall to scan two pages. I probably would use "supposed ask" only on a good-quality copy that I did not intend to spell-tock. Diancopy has said that future OCR software well have a ford-earling mode, it is not early to part of that feature.

I ran the OCR software in standalone mode first. Once I was confident enough, I defined a WIPS menu selection (OCR) using a batch file that called the OCR software, then ran the formatter. With a little extra work, I could have incorporated a variable for the output filename. I wonder, however, why I had to bother doing this at all. The OCR software should have a menu setting for format software selection and do this work for you. Further, I would expect WIPS to integrate OCR into its menu as a default rather than making the user define all the options at the start. This is the weakest area in the package, particularly since all the other elements tie together so nicely.

TEXT AND GRAPHICS Once I had a formatted output file. I called WordStar from the WIPS menu and reformatted the first page. I had WordStar wrap the text around an open area 40 columns wide by 24 lines deep. WIPS provides several target marks that define the upper-left-hand and lower-right-hand corner for inserting images. There are three types of target marks; full size, "best-fit" autoscaling, and automatic cropping, all with or without aspect-ratio compensation. I selected autoscaling without compensation and inserted the target marks with the filename in the text. Once I filed the text. I returned to WIPS and ran the preview mode to see whether I had got it right (another nice feature).

You can merge a number of images with a single text file, so I layered the two samples one on top of the other in a second file. I then recalled the line-art image, windowed the quoin, and saved a third image file. My third merge included two sen-

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arate files (the etching and the new quoin image file), using a newly formatted text file. Previewing all these variations was a real timesaver, because the third merge required a little work to get right.

Printing takes much longer than I expected. Using an Okidata 92, it took over 40 minutes to print just an image. The first sample of merged text/image took 35 minutes; the second took over 20 minutes, Laser printtes undoubtedly print these files much faster and are also preferable if you wan to achieve the best-bossible resolution.

In spite of its Mudgy OCR returns, the Datacopy 730 is an exceptional system. Its Datacopy 730 is an exceptional system is shifty to reproduce half-tones and manipulate images before storing them make this the hardware of choice if you want to scan the widest-possible variety of images. I liked the WIPS menus and the software's creation of a whole environment. A few week spots notwithstanding, the Datacopy 730 is without equal in its price range. —Tom Stanton

SpectraFAX 200

The SpectraFAX 200 is the only color scanner reviewed in this issue. This scanner cannot do text scanning yet, but the company is developing OCR software that it promises will be available by the end of this year.

Later this year, SpectraFAX will also market a desktop publishing package consisting of a Bernoulli Box, the SpectraFAX 200 scanner, a modem, and a laser or thermal printer. This packaging plan brings up some interesting questions about how high-resolution (200-dot-per-

inch) color images can be used in telecommunications and in published materials and how scanners might be used in the future, when high-resolution laser printers will be able to print in color.

HARDWARE The SpectraFAX 200 is big: 10 inches high by 25 inches wide by 15 inches deep. Like many desktop copying machines, it has a flat glass plate on top, on which you place the image to be scanned. A covering lid that has the happy addition of "multijointed" hinges lets you scan images from books or magazines with a minimum amount of interference from

external light sources.

On the front of the scanner are seven indicator lights for such information as power on and tolet you know when the scanner is actually scanning red, green, and blue. The power-on switch itself, also on top, is refreshingly easy to reach. The scanner has only six circuit boards, and I understand that very few users have reported equipment provides diagnostics software to dealers, enabling them to diagnose equipment problems easily.

Installing the SpectraFAX 200 is simple. You insert a half-size card in any PC expansion slot. A simple utility program must be run once to calibrate the scanner so that it sees cofor evenly. The documentation recommends that you run this program periodically to keep the scanner properly adjusted.

The 22-page manual clearly explains and illustrates the steps involved in installation and setup, as well as the scanning parameters that you set through a dialog box in PC Paintbrush.



software used is the popular PC Paintle

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SOFTWARE The SpectraFAX is designed to run with Zsoft's PC Paint-bush—in fact, the Spectraft's Mistallation manual itself is simply an insert to the PC Paint-bush—in fact, mistal a dialog both the PC Paint-bush manual. To scan a document, you select Scan from the PC Paint-bush manual. To scan a document, you select Scan from the PC Paint-bush manual. To scan a document, you select Scan from the PC paint-bush will be possible to the paint bush of the paint bush will be possible to the paint bush will be paint bush will bush will be paint bu

of 0 to 255 (or 256 different shades). You need 500K bytes of disk space when scanning in the black-and-white mode, 2 megabytes when in color mode hence the need for a hard disk system. We scanned in both modes, outputting the black-and-white scans to a 120-dpi Epson MX-100 (its low resolution makes it a proofing device at best). PC Paintbrush will soon release a laser version, and we'll be anxious to see the output at 300 dpi. For a color image, we scanned the cover of last year's issue featuring scanners (PC Magazine, Volume 4 Number 14). The scanner does one sweep across the image for each color, taking just over 2 minutes total. We printed the color images out on a Canon PJ-1080A ink jet printer, which prints at only 84 dpi, but the results were stunning-the relatively low resolution of the printout was overshadowed by the beauty

of the Canon's cyan and magenta inks. Neither the screen version nor the printed version of our color scan showed exact-



The SpectraFAX 200 is the only color scanner reviewed here. Its large size may be a drawback, but if you need its unique capabilities, you'll make room for it.



We used the cover from last year's PC Magazine OCR cover story to test the SpectraFAX 200's color scanning capabilities. Left, the original cover; right, the scanned cover printed out on a Canon PJ-1000A ink-jet printer. The scanner sweeps the page once for each color; scanning the image above took above Tainnines. You can manipulate the color settings to correct or change color are to the scanning the scanning the scanning the scanning that the color settings to correct or change color are the scanning that th

ly the same shades of color as the original, but you can manipulate the color settings so that the scanner sees colors differently For instance, if the scanner doesn't seem to see vellow very well on the first try, you can increase the blue setting. Also, increasing the intensity adds depth to the colors scanned. Unfortunately, the current documentation for the SpectraFAX 200 and PC Paintbrush package contained no information whatsoever about color mixing, so we spent a lot of time experimenting, with mixed results. The company promises that a more helpful manual is on its way. Meanwhile, of course, you can still edit and manipulate the scanned images using PC Paintbrush's tools and commands

The SpectraFAX 200 is an excellent image scanner that seems reasonably priced, considering its color capabilities, even though it doesn't yet incorporate text scanning. The color capability itself, however, brings up an old issue: How useful is color, really, in a typical office environment? An obvious application is color overhead transparencies and slides for presentations. There's no question that companies that do a lot of video and slide production would benefit from the SpectraFAX's color scanning capabilities. Similarly, databases that can store and display color images-medical databases, for instance-will benefit tremendously from color scanning, especially when encyclopedias can be stored on CD-ROM.

Those of us who still need to print out mere pieces of paper must wait for drivers to become available for the 300-dpi blackand-white laser printers. Meanwhile, we'll dream of the day when we can practically (that is, quickly, easily, and relatively inexpensively) print multiple copies of document on a four-color high-resolution laser printer.—Diane Burns and S. Venit

Compuscan PCS 230

Compuscan has been in the CCR business for over 15 years, but uniff exently most of its products have been targeted at the mid-to high-range COR market. For example, the Laser III FormsReader reads handwrite me text as well as standard characters. The AlphaWord series can be used with permitted to the condition of the processing systems like Wang and Lander. With its Introduction of the PCS (Personal Computer Scanner) series, Compuscan makes its first read foraji reins, Compuscan makes its first read foraji reins, Compuscan makes its first read foraji for the condition of the processing the processi

into the personal computer market.

The PCS base hardware consists of the scanner itself and various combinations of firmware or software. Compuscan calls these configurations "models," leading one to believe that three separate machines exist. In fact, the base hardware can be configured to act like all three models for under \$7,000.

The PCS 220 configuration uses special plug-in firmware cartridges to produce formatted files for dedicated word processors like CPT, DEC, IBM, Lanier, NBI, Sidereal, Syntrex, and Wang. The 220 is sold with one firmware cartridge (your choice), but you can swap firmware cartridges in and out so that one PCS can serve a number of systems.

Companies PS 230, for PCs and compatibles, uses software instance of finite ware to produce formatted files from scanned text. Currently, the software can format files for IBM's DisplayWite 1, 2 and 3; MultiMate; Samma WordSur and 3; MultiMate; Samma WordSur 2000; and WordPerfect. (Companies to add other word processing software, but the spokesperson would not be written to the processing software that the processing s

The PCS 240, which was slated for release in July or August, adds graphics scanning software to the existing capabilities of the PCS 230. The scanning software includes a modified version of Dr. HALO II. The scanner can be controlled from PALO II. ALO II. according to company officials, which makes this package sound particularly attractive. You can purchase the PCS 230 and upgrade to 240 capability when it becomes available.

Compuscan announced a fourth model, the PCS 235, in June. The 235 is priced at 53,150 and has the same text scanning capabilities as the 230 but cannot be reconfigured to interface with dedicated word processors as a model 220 or to scan graphics as a model 240.

HARDWARE At first glance, you might mistake the well-designed PCS hardware for a high-end dot matrix printer. It has a low profile, a reasonable footprint, and convenient front-panel controls. The PCS holds up to 50 pages with a maximum The Compuscan PCS 230 looks much like a dot matrix printer. Its input tray holds up to 50 pages, so large text-scanning projects are feasible.



The back of the PCS holds a delightful surprise. In addition to a standard 25-pin serial interface and a socket for plug-in firmware cartridges, you'll find a 40-pin jumper block that lets you set up serial pin configurations. In most cases you don't have to do anything: the documentation gives you the standard configuration for a PC. However, if you find you need a special configuration, like crossing pins 2 and 3 or tying pin 20 to pin 7, you just rearrange the jumpers. This handy feature eliminates the frustration associated with building null-modem or custom-designed cables. Armed with a breakout box and the pin diagram in the documentation's Appendix II, you can connect the PCS to any serial device, including terminals and typesetters

The banks of DP switches allow you to see formatting defaults and communications parameters. Switch I lets you set a "need Guess" default that either flags all unrecognized characters with an "sat" sign (say) or lets the PCS offware make step guess. Another DIP lets you ignore large areas of unrecognized characters of guess of the great of t

The paper path for scanning is similar to that of a typewriter. Pages are drawn be-



tween two rollers and across the scanning window and then ejected at the other end. A stepped rubber wheel, similar to a ratchet, stages each page for scanning. As the scanner ejects one page, another is already entering the pager path.

Paper jams can be cleared easily. When you remove the platen cover, you expose the entire paper path. Two large knurded knobs, which can be loosened by hand, release the platen. Two additional latches that hold a pressure plate in place are pashed back, and the platen can be lifted out. Once you remove the jammed page, you can enseemble the platen and continuous can enseemble the platen and continuous can be considered to the proper of seamed text, but even this problem can be overcome by removing pages from the feed truy, feeding the errant page by hand, and replacing the remaining pages.

The PCS's scanning optics are similar to those of other machines. The line of scanned text is illuminated by a low-frequency red neon light, and the text is reflected toward the front of the machine and then to the rear where scanning optics focus the image on a charged coupled device that digitizes the characters. Recognition and formattine are handled by software.

Hardware installation takes only a minute or 2, and you'll spend most of that time connecting the PCS to a serial port and finding a convenient power outlet in your office. The PCS performs diagnostics on power up and, after a minute or so, gives you the green light to start scanning.

SOFTWARE The PCS 230 uses software to recognize and format scanned text. You can run it on a two-floppy system or on a

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hard disk. The first step is to create an installation disk that contains the necessary font files and formatting software.

tool title shall commaning software.

The Common State of recognizions more than the Common State of the C

Tall TeX CS 20 also fails to recognize domark type, a real limitation. Many kinds of texts—mall lists, customer lists, line listings, and computer-generated reports—are printed only in dot matrix, and it shouldn't be that difficult to devise font files that take low-resolution characters into account. Curously, the old standby font for all scanners, OCRB, does not come standard on the PCS 20 (it is ofcome standard on the PCS 20 (it is oftomers). The proper statement of the PCS 20 (it is ofbowever, since nowadays very few people actually use OCRB.

Font files and formatting software must be placed on an installation disk. You type INSTALL and answer a series of promps for the program drive, document drive, default word processing program, the COM port for PCS, and Compuscan scanner type (the software works with either the PCS or AlphaWord series). The documentation also gives instructions for special

word processing configurations (using MultiMate, DipplyWrite 2 or 3, or Samma Wordy that require you to convert scanned fless before editing. The other compatible word processors do not require the additional installation or customization. You must add the line DEVICE= ANSL SYS to your CONFIG. SYS file (if it doesn't exist) and remove any other DEVICE= lines. Then reboot the system and you're ready to scan.

OPERATION Once you start up DOS, you can run the Scancom software at any time. If you have installed the software on a hard disk, you simply type CD\SCAN and run the software; two-drive systems require you to run Scancom first and then convert or edit scanned files with a compatible word processor.

A stup sheet is scanned first to prepare the PCS. You doat the remaining pages face down in the feeder and place a blaim sheet where you want the scanning to stop. You can scan a number of different documents by separating them with blank pages; once the scanning stops, you can file the recognized text and then shart scanning a new document. The automatic feed and blank-page separation features make the properties of the production of the production of the production of the production environment.

For simple scanning of ASCII text without formatting codes, you can use your favorite communications program or the simple communications program provided with the Scancom software (the setup sheet loads this software). If you use your own communications program, load

it and set it up for file capture. When you're ready, type SCANPI and the filename, then press the start button on the front of the FCS. As it scans and recognizes each page, the text flows onto the screen. The Scancom software writes flow to disk once scanning is complete; your communications program handles captured text as it would from any serial device. In both cases the results are much the same—a single ASCII text file.

The PCS software really shows its stuff when it works with a compatible word processor. Depending on which word processor you chose during installation, scanning is either a one- or two-step process. For Volkswire. WordPerfect, WordSlur, and MornSlur 2000, you simply type SunAn and the filename. The PCS 200 scars the file and recognizes the characters; the Scancom software adds the formatting codes for you. The final file is ready to cidi. DisplayWire! 1, 2, and 3; MultiMura and Saman Word require that the scanned files be prepared for editing. If you have a made disk, the Scancom software automatically calls up the word processor and the correct mean is occurred the files correct mean is occurred the files correct means to convert the files; the you have to load the word processor and word the scanned and the scanned that the

THE FUTURE The PCS 240 software, which will add graphics scanning draphics reason and calding capabilities, was not ready at press. The commentary of the co

According to Compuscan, the PCS 240 will use a parallel interface to send scanned images to the PC, and a modified version of Dr. HALO II will be bundled as part of the software. Dr. HALO II lets you manipulate graphics. Integrating the text and graphics is another matter; this will probably be accomplished through Scancom by adding a software "hook" into the word processing code.

The PCS 240 is easy to install and operate. Except for its lack of dot matrix font recognition, it is the consummate midrange text scanner for the office: automatic sheet feeding, a simple paper path, and formatting of scanned text are all standard features. When graphics scanning and editing software is added, the PCS is likely to become a major contender.

—Tom Stanton

Compound Document

Last year I was bowled over by the Kurzweil 4000 Intelligent Scanning System, which did something I hadn't seen any optical character reader do before—



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THE TOTAL CONTRACTOR OF THE PARTY OF THE PAR

scan and recognize proportionally spaced typeset characters. The 4000 can be trained to recognize a number of type styles within a document and, once trained, can scan documents in production mode with a throughput rate ranging between 30 and 50 seconds per page. With additional hardware it could also scan multicolumn text, its high bose price what the 4000 offered (see "The Kuraveid 4000 A State-of-the-Art Reader," PC Monecules Volume 4 Number 14.)

The Kurzweil 4000 is no longer alone in its price/performance category. A formidable challenger that is smaller, faster, smarter, and competitively priced has stepped into the ring: Palantir Corp.'s Compound Document Processor (CDP).

Palantir (not to be confused with the software company of the same name) is new in the scanner field. Its press kit sounded too good to be true, claiming that the CDP could scan simple pages, multicolumn pages, and most of the common fonts in type sizes from 6 to 28 point-with or without graphics-in 8 seconds. It could then recognize the scanned characters and format them (multicolumn or simple galley) in under 60 seconds for an average text document (slightly longer for compound documents). What made the Palantir CDP sound most remarkable was that it did all this automatically, without being trained first by an operator.

HARDWARE On the surface, the CDP is disarmingly simple: a long box (13 by 16 by 27 inches), with the scanner optics and

paper handling at one end and the connectors at the other. The front panel has a twoline LCD display and four operator buttons. Besides setting communications parameters and scanning density, you can select scanning options based on the format or characteristics of whatever text you're scanning. You can select vertical or sideways scanning: alpha only, numeric only, or alphanumeric scanning; ragged left, ragged right, centered, or justified text formats; and multicolumn page-image format (where column formats are kent intact) or galley (where columns are stripped into a single column). The CDP offers so many options and combinations that the only problem is choosing among them.

Above the controls is a 50-page feed tray that accepts documents from 3 by 5 inches up to 8½ by 14 inches; below, and in hoper nearly collects the scanned documents. The paper path feeds pages straight across rollers from top to bottom and has an access door that you can use to bottom and has an access door that you can use to charped read or the company pains. The CDP illuminates and exam seach page, flowing the image onto a charged coupled device at the rea of the machine. The scanning resolution is 300 dots per inch.

Most OCRs process a character or a line at a time. The CDP achieves its high scan rate by dumping an entire page image into 2 megabytes of nobacud RaM for processing. The board's recognition engine includes five Motorola 6,8000s. I megabyte of additional RAM, and 1 megabyte of ROM. All character recognition is done on the CDP, the loss system has only to accept the ASCII stream or bit-mapped page immapped page immapped

The CDP can use one of three communications interfaces to a variety of boxes standard serial (RS-232) or optional Elehenter of Multibus. Unlike the Kurzweil 4000, which requires its own computer system, terminal, and mass storage, the CDP can take advantage of existing host resources running UNIX or DOS. I saw the CDP run on two different machines: the first, a Saw workstation running UNIX, could display a whole page as a time and control of the country of the countr

The CDP was then connected to a RA with a high resolution (1,280 by 800). Wyse WY-700 monitor (see "DOS Meets the Workstation." PC Magazine, Volume 5 Number 11) that requires its own interface board. The WY-700 seron cannot display awhole page of formatted text at a time, but it can display compressed graphics if they fit in the 640K-byte workspace. Although you can use an EGA or CGA board to precess text, naffer of these vident of the workspace.

to display the graphose. This in itself does not put the CDP out of reach for PC users. James Landerkin, who runs Palantit's Sockwille, Markaland, office, pointed out that the AT's connected out that the AT's connected outside the CDP for under \$8.000 per PC. This is compatable in price to manage, of the CDP for under \$8.000 per PC. This is compatable in price to manage, single-user scanners that have a third the scanning capacity. The graphise could be handled by once or two PCs outfitted with the necessary high-resolution boards, or the single workstation.

SOFTWARE The CDP takes the page image stored in RAM and performs two operations. First, it separates text from graphics on the page image. Then it compresses the page image, including any graphics, to CCITT Group 3 or 4 facsimile standards for storage or to be sent to a host system for further processing.

The text is converted to ASCII format using patented font-recognition algorithms. According to Palantir's president, Daniel Macuga, the algorithms are president, Daniel Macuga, the algorithms are most based on either matrix matching or feature recognition—the two traditional methods of character recognition. Martin matching limits the size and style of the characters you can scan, while it is accurate, it tends



The box that holds Palantir's CDP is deceptively simple. This text-and-graphics scanner is packed with sophisticated capabilities.



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SCANNERS

to be slow. Feature recognition can scan most sizes and styles, but it requires operator intervention when it encounters exceptions, such as a broken character or stray marks on a page.

Palantir would not comment on the algorithm at all. My best guess is that the CDP algorithm uses a combination of both methods: a form of matrix matching to verify the basic character shape and feature recognition to confirm the decision. According to Palantir's press literature, "A single character reference ('I', 'P', etc.) represents multiple type fonts." This phrase suggests that as a page image is dumped into memory, one software routine decodes the bit stream, strips the font features, and performs some form of matrix matching to determine the basic character shape. A second routine takes the same page image and performs feature recognition. The two routines compare results and produce the ASCII stream. This might be done in two steps or in parallel; however it is done, the final result is character recognition.

I'm basing my speculation on two points: First, the CDP has some difficulty with tightly kerned text, where letter spaces are very small or nonexistent; occaters and flags them. Second, the CDP separates text from graphics before it performs recognition, which suggests that the bit image is decoded according to the density of dots (low density for text, high

density for graphics). The CDP backs up character recognition with spell checking and context checking. The spell checker flags characters and checks them against an 80,000word dictionary. The algorithms are strict, and so the CDP may flag characters even when they are spelled correctly: to this end the operator can run it in a "loose" mode. in which flags appear only when the CDP is very unsure, or in "tight" mode, in

which the CDP displays all flags.

Context checking further verifies words when the CDP spell check is not enough. For example, the word MAgazine would convert to Magazine because most English language words do not start with two capital letters. Similarly, the CDP may scan the word little as little, but convert it back to little because no word begins with a number. Conversely, context checking recognizes that the string "S100.00" is "\$100.00" because numbers rarely contain letters. The operator can turn on an alphabetic or numeric mode, depending on each type. The CDP might flag a lot of characters in mathematics texts, where letters and numbers are intermixed freely.

Character flags are embedded in the text, while the CDP sends along its best guess based on its extensive checks. The software allows an operator to choose whether to display flags or not, and a single key can be programmed to search for the flag and delete it, leaving the cursor on the flagged word for editing.

THE DEMO Because it does not sell the CDP directly to users but markets it through other companies, Palantir would not send us a review unit but invited us to the Rockville, Maryland, office for a demonstration. I arrived armed with my samples, prepared to be disappointed. I left impressed, especially because the press kit turned out to be relatively modest in its claims. The CDP was first connected to the Sun workstation. Everyone was quick to point out that the CDP did all the processing and that the Sun was used only to show the full resolution of the scanned image.

After we ran through the available operator controls, which you input via the front panel by pressing a combination of four buttons, we loaded a stack of samples into





This detail from Palantir's brochure for the CDP (left) was scanned and then printed out on a laser printer (right). The time required to scan an image like this one is short-about 8 seconds-but printing out the image can tie up the printer for 45 minutes or more. You can get good lowresolution images on a PC AT, but for really high-quality images you d have to connect the CDP to a Sun workstation.



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the sheet feeder for scanning. The samples ranged from a simple business letter to a complex page from a journal, with three different columnar arrangements and several font sizes and styles.

The Stan displayed the scan time for each page, which averaged about 8 seconds. The processing time varied from a few seconds for a simple format to 70 seconds for the most complex page. After image, and Lompared the printed page to the secret image on the Sun, which displays one type size per page, based on the page image size. A simple item is displayed the page to the page size per page, based on the page made size of the page size. A simple item is displayed the page size of the page size o

and the samples displayed perfectly and were formatted, line for line, identification were formatted, line for line, identification samples was deliberated printed sources. For example, in the column were not even with those in the second column. The CDP dutfully formatted the page with the missilgment intext. It formatted the next sample, in which the columns did line up, line for line. The samplest provided were anticlimate: the CDP scanned text and graphics with little CDP scanned text and graphics with little characters, which the CDP flagged (as did all the scanners) tested?

We tried random pages from PC Magazine to see how they would scan. The First Looks opening page presented some interesting problems. The page had eight different fonts, reverse type, halftone photos, color, and tightly kerned 9-point type in two banks of four columns each. I don't know of a single scanner that could scan, recognize, and format this kind of page without a great deal of effort. The CDP did its best and was pretty successful. Reverse type cannot be scanned, and so the CDP ignored it in text mode. The two headlines were over 28 points, and so it converted them to graphic images. The CDP scanned and recognized subheads and text, although the small italic page captions caused a few characters to squeeze together. Nevertheless, the final result on screen approximated the page, including the columnar format and text runarounds, and at least 85 percent of the characters were scanned and recognized correctly. Here's

the kicker: the CDP did all this in under 2 minutes, with no training and no previous input. It even tried to scan and recognize a line of type printed sideways outside the

page box I then tried page 118 from last year's PC Magazine cover story on scanners (Volume 4 Number 14). For this page, which was more typical of the kinds of magazine articles that would need to be scanned, the CDP scanned and formatted all three columns plus the page number and footer in under 80 seconds. We switched to the graphic image of the page to see how it looked. At 300 dots per inch it looked better than a typical photocopy, which tends to drop out grav areas and solarize an image into massive areas of black and white. The CDP image was so good that we could easily read the Dest logo above the page feeder.

GRAPHICS The CDP scans graphics at 300 dots per insh. The results on the Sun were impressive, but even on the PC they were better than you would expect. The CDP can compress graphics into Group 3 or Group 4 (CCITT) facsimile standards for transmission. Graphics editing and text/graphics merge software are not included with the CDP, but most workstations are equipped with the necessary software.

sary software. AT users have to control with finited femony and a lower-scotlation with finited femony and a lower-scotlation screen, graphies must be displayed in a compressed mode to fit within the 640Kbyte workspace. So far, Palantir has not tried to use either expanded or extended read to the control of the cause images must have contipuous memory. Even if you could fin at lit-page image into memory, few displays for an AT could match the Sun (or any) other workstation) for resolution. With the workstation for resolution. With the or horizontally to see the entire image.

A MATTER OF FORM The Palantir folks showed me something the CDP can handle that most scanners tend to avoid: forms processing. The CDP software allows you te define 256 rones, for selective scanning of a page. You scan the desired form and display an image of it on the workstation. This image is a compressed

version of the bit image but is more than acceptable for defining scan areas. The CDP defines a home position on the bit image of the form and then lets you specify areas with a mouse. The areas used in the demonstration included a name, address, phone number, and signature line. I dutily signed my name, and the image was scanned. Based on the user-defined areas, which is a support of the data and converted only the defined areas into ASCII text. My signature was converted into a graphic.

You can define certain areas as rotated (in 90-degree increments) so that the CDP can also scan form numbers that are printed vertically. User-defined areas are stored along with the bit image of the form, so that when you scan additional forms you don't have to redefine the areas unless you need to make a change. To demonstrate forms scanning, the Palantir staff ran a demo created for a previous customer on some Federal Express airbill receipts with user-defined areas. With one exception, the CDP scanned each area perfectly. The exception was caused by fuzzy letters on the form (we weren't scanning the originals, but carbon copies-that in itself is more than most OCRs can do).

Palantir's forms handling alone gives the CDP a marketing edge. None of the other scanners reviewed in this issue adequately handle forms; if they handle them at all, they perceive them as an ASCII doc-



CIPICLE 670 ON READER SERVICE CARD

ument and have no capacity for selective scanning of fields. The CDP does not go so far as to format data from forms to be merged into databases.

FAULTS The CDP is not flawless by any means. It shares many of the usual scanner handicaps, notably a difficulty with letter ligatures and tightly kerned type and an inability to adequately scan and recognize a string of vertical characters like "ill," which it may read as "111." The density adjustment can compensate for some of this, but even with spell checking and context checking, the CDP cannot ensure 100 percent perfect recognition.

At present, the CDP does not differentiate type sizes or styles; all recognized text is converted into a straight ASCII stream without style attributes. The operator must add whatever the CDP stripped out, which may entail a great deal of work if you use the CDP for desktop publishing. Palantir plans to introduce additional software to

handle the size and attribute problem. Most of the midrange scanner manufacturers have settled for limited-capacity scanning of monospace text and have added graphics scanning as an enhancement. These products fill a narrow and specific need in some offices but are not adequate for general-purpose scanning. The Kurzweil 4000 offers considerably more but requires a trained operator and a dedicated computer. It has answered the needs of real power users, such as publishers, but

is too esoteric for most business use. Palantir's CDP fills the gap. It is as easy to use as the lower-priced scanners and has the power of a Kurzweil 4000. More important, the CDP was designed for the office-with text, graphics, and forms handling built into the system. This is the first scanner I've seen that actually fulfills the promises scanner manufacturers made when the earliest models debuted over 20 years ago. It can scan and recognize any printed page, or selected portions, and deliver the contents to the host as desired. The graphics scanning is more than a hook into publishing; scanning signatures. photos, or other pictorial information for databases is not far off. In tandem with a WORM (Write Once Read Many) CD-ROM, the CDP could be a cornerstone of any automated office.—Tom Stanton

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 Runs in virtual page to maximize memory
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questionable clones at the expense or sacrificing ruil compatibility, quality, reliability, and user satisfaction.

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The Two FACES

of IBM's or is the even and added to rest the 8-MHZAT

Is the new 8-MHz IBM PC AT an alreadyoutdated latecomer to the high-speed market, or is it the most desirable 80286-based machine available? The truth

machine available? The truth is in the eye of the beholder.

BM's new Personal Computer AT, with its
8-MHz coke speed and 30 megglyte hard
disk, is like a straggler arriving late at the
party, a little mystiffed that nodody is paying much attention. This machine was outmoded even before it was available. It runs
not nater than a 6-MHz IBM PC AT whose
crystal has simply been switted and is
consistent to the control of the control
cheaper machines from manufacturers.
who see 8 MHz as a starting notin rather
whose 8 MHz as a starting notin rather

than an upper limit.

The new PC AT, like the old one, has only a paltry 512K of memory on its system board when there is plainly room for 512K more. Many AT-compatible matchines have at least 640K, if not I megabyte, on their system boards. Typically for an IBM product, the new AT displays design timidity and lack of innovation. It is IBM's latest attempt at putting a cap on the processing power it is certainly capable of building into a machine.

That's one way to look at it.

On the other hand, the 8-MHz PC AT is now IBM's top-of-the-line personal computer. It is thus the best AT-compatible available and the only sensible one to buy.

WHERE IT STANDS In fact, both of those descriptions are correct. Anybody who is considering purchasing a PC or AT has to make a difficult decision: to buy IBM or go with a compatible. If you decide to buy IBM, you are not basing your decision on performance, features, or price.

On all tests that measure processor speed, the 8-MEP CAT clocks in about 33 percent faster than the older 6-MEP. AT, as you can probably guess by dividing 8 by 6. This simple 33-percent increase reveals that the AT hardware is still inserting one wait state into system-board memory accesses. The memory chips on the system board are rated at 150 nanosconds.

The speed of floating-point calculations using the 80287 math coprocessor also shows a 33 percent increase in speed, which indicates that IBM is still using the shortcu method of wiring up the 80287. The 16-MHz crystal in the new AT runs the 80287 at one-third the crystal speed, or 5½ MHz. (The 80287 in the older 6-MHz AT ran at 4 MHz, one-third the speed of the 12-MHz crystal. The 80286 micro-

processor runs at haif the crystal speed.)
Disk speed comes in about the same as
that of a 6-MHz AT, which is also not supprising. Although we did not receive any
technical reference for the new AT, its
BIOS reports that the AT's 30-megabyte
hard disk has 732 cylinders, 17 sectors per
track, 512 bytes per sector, and five heads.
The cluster size (also the minimum
amount of snace allocated for a flel is 2K.

"IMPROVED" KEYBOARD When you buy a new XT or AT these days, the moment of truth will come when the salesman asks, "Do you want the new keyboard or the old keyboard?"

The IBM Enhanced Personal Computer Keyboard is IBM's latest attempt to design the perfect standard keyboard. IBM is

■ The most welcome keyboard change is the separation of the cursor keys from the number pad.

strongly indicating that this keyboard, which was unveiled along with the PC RT, will be the standard for future products. Even a machine as different as the laptop IBM PC Convertible has a keyboard based

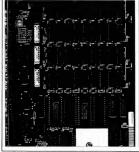
on the same layout. The new keyboard is definitely maddening at first. To drive WordStar users insame, the Capb.Cck key is now located where the Crd key was once found. To drive MultiMac users insane, the function keys are now stretched across the top of the keyboard. IBM has added two new (for the PC) function keys. F11 and F12. Two Crd and two Alt keys falls the Spece bar. That problematic Esc key has been moved back to the top left of the keyboard, near the function keys. One-key Pause and PrtSc keys sit to the right of the function keys.

The most welcome change is the separation of the cursor keys from the number pad. The number pad includes duplicated Plus, Minus, multiplication, division, and Enter keys. The cursor movement keys are arranged almost in a diamond nattern.

The new keyboard has been designed to minimize sookware incompatibility problems that could result from a separate cursorpad. When NumLock is on, the cursor leavy seperates each codes that make the keys appear to be combinations of the Shift and the cursor keys on the number pad. When NumLock is off, the cursor keys generate the same scan codes as the number berpad cursor keys.

However, programs that grab the hardware keyboard interrupt and attempt to do

The new AT's system board is reorganized but similar to the old. Its two banks of 250K-bit memory chips (right) provide 512K bites of memory, but there's clearly room for 512K bytes more. Banks of 128K-bit chips crowd the old AT's system board (left).





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a mid-range budget. But now, you can settle for a whole lot more. With the new TeleCAT-286;

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their own key processing may nut mixe be problems. Couldn't gat X, Write II to use the separate cursor keys and number keys cornectly unless el nettered the program with NumLock off. Microsoft Windows didn't seem to have any problems untit tried to block out text by shifting the cursor keys. However, If you run into problems, you can always go back to using the number pad for cursor control, just as you do now. From the software's perspective, the number pad works the same way as it almater pad works the same way as it al-

ways did.

Programs that use the BIOS for keyboard information should have no problems using the separate number and cursor keys. This keyboard is just one more lesson that demonstrates to programmers the advantages of using the BIOS rather than directly accessing the hardware.

With this understood, how can programs use the F11 and F12 keys through the BIOS? They can't. The F11 and F12 keys generate hardware scan codes (specifically 57h and 58h), but the BIOS ignores them. A program that wants to use F11 and F12 has to grab the keyboard internut.

The feel of the new keyboard is a little mushier than the old PC and AT keyboards', but not nearly as mushy as that of a typical clone keyboard. On most clone keyboards, it's never quite clear whether you're typing or making mudpies.

I could get used to this keyboard. I could even learn to love it, however reluctantly. I have the uneasy feeling IBM is telling me, "You'd better learn to love it, because this is the keyboard of the future. Our decision is final."

You're not trapped yet, however. The best thing about the new keyboard is that, at least for now, it's an option. The old one is still available. I tried plugging an old AT keyboard into the new AT, and it worked little fine. INTERESTING ALTERNATIVES IBM's S-MILE PC AT is not the machine for you if you want high performance at a low price. More-interesting, more-compact, and less-expensive ATs are becoming available from other manufacturers. Several of these new AT compatibles have recently passed through PC Magazine Labs and have proved outle impressive.

The PC's Limited 280 12 (PC News, page 33, PC Magazine, Volume 5 Number 13) is certainly a marvel. With a hard skit, the 286 12 costs just \$3.500, about \$5.1,000 is set than the new IBM PC AT. the skit was set that the skit with a single state of the skit with a skit wi

indicates if you've crashed your machine.
The Toshiba T3100 (PC News, page 33, PC Magazine, Volume 5 Number 13) is another attractive alternative. The T3100 costs \$4,499 and has an 8-MHz

A faster clock speed is one of the few changes in the new AT. Its 16-MHz crystal (right) runs at MHz; the old AT has a 12-MHz crystal (left).

80286, 640K of memory, and a hard disk drive, albeit only a 10-megabyte one. The T3100's truly distinguishing feature is its size: it's a 15-pound laptop with a very readable plasma display.

reasonic plasma ospay.

With these options and many others available, who would even consider buying an BMS -MME PC ATT Many have, and many will. Even people who have saffered ATT hand disk, failures, who have been disappointed by such BIM releases as excited, who their control of the property of the

Sound crazy? Not at all. Buying IBM implies that you recognize differences that go beyond performance, features, and price.

WHY IMP: Like it or not, IBM calls the stots in this market. The hardware standards that have come about without IBM's endorsement (the Hayes modern, the Hercules Graphics Card, the Louss/intel/hation, are so few that they prove the rule. Half-adozen colorigraphics boards attempts to bards attempts where until IBM introduced the Enhanced Graphics Adapter and set the new color video standard.

IBM makes the originals, and everything else is a copy. A compatible's ROM BIOS must be different from IBM's, or its manufacturer will get a letter from IBM's lawyers. However, deviations from IBM's design—even in the form of improvements—can as an incompatibilities.



Personal Computer AT IBM Copp. Contact your nearest authorized IBM dealer. List Price 15.295 (with 8-MHz clock, 30-MHz clock, 30-MHz clock, 30-MHz clock, 31-MHz clock,



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from "XENIX RISING: The Ascent of Shared Information

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■ 8-MHz PC AT

The three big lies of the personal computer market are "We'll be ready to ship next week," "Our tech support is excelent," and "it's loop percent IBM compatible." One-hundred-percent compatibility foot percent IBM compatible, and incompatibilities catile term this that only IBM is 100 percent IBM compatible, and incompatibilities catile even between IBM's own FC, XT, AT, FC, Pr Protation, and Converting the Compatibility of the Protation of the

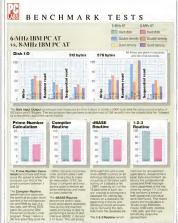
I'm not talking about Lotus's 1/2-3 and Flight Simulator. Nobody will ship a compatible that does not run these programs. I'm talking about things like software you got from your bank to do home banking over your modem. Your bank can't help you. The manufacturer of your compatible can't help you. You're stuck.

can't help you. You're stuck.
Peripherals can pose tricky problems
for compatibles as well. Nobody, after all,
has ever written a letter to PC Tutor that
began, "I have an IBM PC, an IBM
Graphics Printer, and an IBM Color/Graphics Adapter, and I can't get them
to work right together."

IBM's PC and AT have been characterized by conservative hardware design. Although the original AT was certainly capable of running at 8 MHz rather than 6 MHz, IBM decided to curb it at 6 MHz. But the very fact that it was capable of running faster means that margins have been built into the design to ensure greater reliability. A manufacturer of an accelerator board once told me that the IBM PC bus timings were so conservative that his engineers were able to cut corners all over the place to get more speed out of the machine. I believe it, but this particular accelerator board was about as stable as a drunk on a high wire.

Manufacturers of compatibles are able to come closer and closer to IBM's hardware and ElOS, and they continually make adjustments as they learn how much they can change things without becoming incompatible. Many compatible maximize can now run of 1-he-shelf PC-DOS. (Running BASICA, which comes with PC-DOS, is still a problem since it uses a version of BASIC in ROM on IBM's system board.)

However, even the subtlest differences



The new 8-MHz PC AT is, predictably, about 33 percent faster than its 6-MHz predecessor. Lots of turbo-charged competitors can easily beat these times, but the new PC AT offers one thing they can't beat: the IBM logo.

may cause problems in the future. As the EGA takes over as a video standard, for instance, we are likely to hear reports from people who card 'install an EGA in their older clones. If you have an old IBM PC with the original BIOS, you can 'install an EGA—but you can get a replacement BIOS from IBM. Can you get one from the manufacturer of your clone? Buving IBM ultimately means playing

course, some people get along fine without insurance, and others simply can't afford it. For them, the market is full of alternatives that will easily outperform IBM's new PC AT.

it safe. Think of the logo plate on the front

of the case as a little insurance policy. Of

PC Magazine.

The most significant development in monochrome graphics since the Hercules Graphics Card.

Announcing the Hercules Graphics Card Plus.

Four years ago, the Hercules Graphics Card brought high resolution monochrome graphics to the IBM" PC for the first time. And revolutionized the world of personal computers.

Now, it's happening again.
Because now there's the Hercules
Graphics Card Plus. A giant step
forward in technology that creates a
whole new standard for graphics
hardware and a world of potential for
software

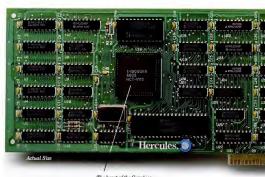
Three modes are better than two. Until now, graphics cards have had only two modes to work with: text and graphics.

Text mode is very fast, but it's limited to 256 pre-programmed characters.

Graphics mode, on the other hand, lets your software create as many characters as you want. But for text processing, graphics mode can be slow, painfully slow.

Enter a new, third mode. Called RamFont."

Two years in development, RamFont gives you the best of both worlds. It blends the blinding speed of text with the flexibility of graphics.



The heart of the Graphics Card Plus: the V112 microchip, Hercules' next generation video processor that makes the Ramfont mode possible. Enough flexibility to blow the doors off the 256-character limit of text mode.

Because RamFont can handle an astonishing 3072 different characters of various widths and heights.

various widths and heights. Instead of 256 canned,

unchangeable ones.

The future

according to RamFont.
With all these characters and
fonts to work with, software
will never be the same again.

RamFont word processors, for example, will put italics, boldface, and scientific characters right on the screen with standard text. So you can see what you're about to print.

RamFont spreadsheets will use smaller characters to display larger amounts of information. So you can get the big picture.

RamFont integrated packages will mix true text and graphics and turn your PC's screen into a fast-lane version of the Macintosh's:



The Hercules Printer Cable a \$40 value, free with each Graphics Card Plus.

And if you happen to be one of those geniuses who's fluent in five languages, you'll be able to type a letter in all of them.

Simultaneously.

A Herculean feat.
How did we manage
to combine the radical new RamFont on
the same card with

Hercules' legendary sharp text and high resolution 720x348 graphics and still be 100% compatible with the original Hercules Graphics Card?

It wasn't easy.

In fact, it took two years and all of the sophisticated CAD tools at our disposal to create our exclusive V112 microchip.*

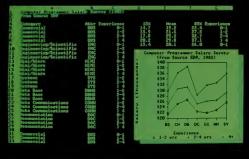
This totally new generation of video processor is at the heart of every Hercules Graphics Card Plus.

It's also at the heart of a revolution in software that's beginning right now. Turn the page and you'll see what

we mean.

*Patent applied for





Lotus 1-2-3 Rel. 2 in the RamFont mode of the Graphics Card Plus: fast scrolling. a 90-column by 38-row screen and a pop-up graphics window.

Software will never be the same again.

The trouble with most new hardware introductions is that there isn't any software available to introduce them to.

Not so with the new Hercules Graphics Card Plus.

It runs everything the original Hercules Graphics Card runs.

Better yet, it comes complete with the software you need to start using the revolutionary new RamFont mode right now with some of the world's favorite programs.

Lotus blossoms. Of course, if you want to talk about

the world's favorite programs, you have to start with Lotus 1-2-3 You won't recognize Release 2.

Because now you can put nearly twice as much information on your screen, scrolling right and left and up and down at speeds you'll remember nostalgically from the days of Version 1A.

Another thing you won't recognize is that cute little graphics window. You can thank RamFont for that.

Now that RamFont is with us. you can pop up a graphics window any time you're in the mood and still keep your 1-2-3 spreadsheet in the background.

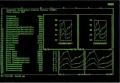
And you can do the same with Symphony," of course.

Or, if your tastes tend toward Ashton-Tates's Framework" II. vou'll be pleased to hear that you can really



That and will along to the own main

The Graphics Card Plus in RamFont mode showing multiple fonts created using FontMan; a Hercules program that comes free with each Card.



The programmable RamFont is so flexible, Symphony can mix true text and graphics.



Ashton-Tate's Framework II with italics and boldface and speed in the RamFont mode of the new Hercules Graphics Card Plus.



Microsoft Word in RamFont mode: italics, boldface and small caps—plus speed and lots of it, at last.

burn rubber with its word processor. The revealed Word.

Speaking of word processors, remember a couple of pages ago how we said they would be forever changed? Well, the change has already begun.

For example, the Hercules Graphics Card Plus with RamFont makes Microsoft* Word a whole new program.

Suddenly the italics, boldface, superscripts and subscripts scroll superfast. Which means you don't have to twiddle your thumbs waiting for the screen to catch up with your fingers.

More to come. As time goes by, more and more major programs will take advantage of the extraordinary capabilities of RamFont.

Which gives you two choices. You can buy a Hercules Graphics Card Plus and look forward to getting your socks knocked off.

Or you can buy another card and watch while technology leaves you and your socks behind.

To help you make up your mind, we've prepared a little surprise for you on the next page.

Just make sure you're sitting down.



Shocked? We thought you'd be.

Imagine, the new Hercules Graphics Card Plus with the power of RamFont plus everything that made the original Hercules Graphics Card the monochrome standard.

At about half the old price.

Now that's progress.

Call 1-800-532-0600 ext. 204 (in Canada call 1-800-323-0601 ext. 204) for the name of an Authorized Hercules Dealer near you and we'll rush you a free info kit.

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A Few Words About TECHNOLOGY



Victoria de la compania del compania del compania de la compania del compania del

scious builder of high-end sailboaus. Recently, a more serious problem threatened Edey & Duff. Duff has suffred from Parkinson's disease since 1999, but he had overcome the physical limitations imposed by the disease to keep the companyalive. Then about a year and a half ago, his condition worsened. At least a test this voice sutreed measurably and his must-cles weakened uncontrollably. The simple task of typing a press release on the task of pring a press release on the sailboard of his Compaq computer frequently seemed as gargantuan as crossing the Atlantic in one of his sailboats.

Acting on the recommendation of a friend, Duff bought a Kurzweil KVS voice-recognition system from Kurzweil Applied Intelligence Inc. The KVS, which plugs into the PC, allowed him to trade his computer keyboard for a microphone. Duff inputs copy verphone.

bally, and the computer types what it hears onto the screen. Because the KVS, like all voice recog-

Because the KVS inizers, understands only a limited number of words, even the staff at Kurzweii doubted Duff could use the device efficiently for his application. "I was told very explicitly by the company that the KVS would absolutely not work for word processing because its vocabulary—1,000 words—is not large.

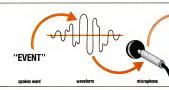
and speech synthesizer hardware is still in its infancy, but these devices can be immensely useful in many applications for those willing to take the trouble

Voice-recognition

enough," says Duff. "That's no real problem. In writing advertising copy, I use about the same 500 words 80 percent of the time. And if I'm using a new word, I sim-

How Voice Recognition Works

The vioice-recognition process is practically identical for every unit we tested. The user speaks into the computer through a microphone or telephone. A microprocessor on a plug-in-board inside the PC analyzes the world waveform, changes it from analog to digital data, and assigns it a code with the vocabulary liet you've taught it when it finds a match, it puts that word on the screen.



ply spell it into the system." Now Duff spends a productive 4 hours each day at his KVS. He describes it as the device that rejuvenated his spirit and ensured his ability to keep working effectively.

VOICE TECHNOLOGY Peter Duff is one of a small but increasing number of PC users who work with voice technology. This umbrella term includes voice recognition, in which commands and data

are spoken into the computer, as in the KVS; and speech synthesis, in which the computer "recites"—in its own voice—either words that are typed into the machine or preprogrammed scripts.

The sales of voice-technology

products as a whole (that is, not only as a peripheral to the PC) reached \$20 million in 1985, up from \$14 million just 2 years ago. What's more, this year the voice technology marketplace supported a well-attended 3-day frade show, Speech Tech 86 (presented by Media Dimensions of New York) that highlighted 30 exhibitors and

150 speakers. As attendees moved from booth to booth, one fact became crystal clear the PC and its compatibles now constitute the dominant hardware in this field. Indeed, many observers feel that the PC is directly responsible for much of the growth in voice technology over the past few years.

"The PC provides the voice-technology industry with something it didn't have for a long time: a standard environment that makes its products accessible to a much larger market and, in the process, helps bring prices down," says William Creitz, editor of Voice/wers, a newdeter that reports on voice technology, "Before the PC appeared on the scene, you typically had big, expensive standalone voice recentizes and speech synthesizers. Now most of the market is tied to the PC plug-in cent!"

Interstate Voice Products' VocaLink SRB-LC, the least expensive recognizer.

VOICE ON A CARD At the heart of most PC voice-technology products is an expansion board that contains a group of dedicard microprocessors plus an analog-to-digital converter for voice recognition or a digital-to-analog converter for speech synthesis.

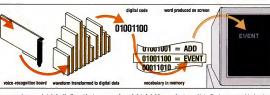
A microphone or a telephone serves as

the input device for a voice recognizer (most products include an incrophone). When the spoken word (analog data) enters the voice recognizer, the analog-to-digital converter breaks down its wave-form or speech pattern into digital data. The system then attempts to understand the spoken word by matching the resulting digital code with others that have been grammed into it. After it finds a match, the

voice recognizer outputs the word or phrase to the PC screen

Speech synthesis is a far more complicated process. The input device is the keyboard, which sends ordinary ASCII text (digital data) to the synthesizer. This text is first analyzed by a normalizer that expands abbreviations to their full-word form and handles puretuation and other nonalphabetic mallzer would translate. "Jan 2nd at 589 Overlook Dr., St. Louis" into "January Twenty-Second at Five Eighty-Nine Overlook Drive, Saint Louis."

The speech synthesizer then looks in its dictionary for each of these words. If they're all there, the digital-analog converter transforms the ASCII text into programmed corresponding speech patterns (analog data) that contain information on protunciation and infection; the synthesizer then outputs these as spoken words. If an ASCII word is not in the synthesizer's dictionary, it's put through a series of linguist's algorithms that problee photomene, syllable separations of the problem of the separation of the series of the seri



tors, and stress and pitch detail; all provide instructions for coding a word for pronunciation. Then, as before, the coded text is ready for digital-to-analog conversion and output in the computer's voice.

TRAINING YOUR COMPUTER The lion's share of voice products currently available for the PC handle voice recognition. The central software component of these packages is a voice-activated leveloard utility that allows you to

keyboard utility that allows you to train your computer to generate keystrokes from your spoken words.

To start this training session, you first carefully plan a vocabulary of command words (or phrases), with a corresponding instruction for each. For instance, if you are using the voice recognizer as an overlay for DOS, one command could be "Check Disk." and its corresponding instruction. "CHKDSK < Return>. "Once you've chosen your vocabulary, you type in the list of words and instruction. Sent. by presenting each."

word a number of times, you train the voice recognizer to understand that the verbal "Check Disk" is equivalent to the ASCII "CHKDSK «Return»." After this session, the computer knows enough to put CHKDSK on the screen and execute the corresponding command each time you speak that phrase into the attached microphone or telephone.

Each training session builds a voice template that depicts the way you pronounce each word. It is helpful to say the word three different ways—one time using normal speech, and the other two using variations on your typical tonal range—so that the template includes a wide range of data about your voice and the different ways you pronounce words.

Teaching voice recognizers is a slow process, and there are limits to how many words they can retain, ranging from a low



The Texas Instruments Speech Library, a fullfledged programming tool.

of 400 to over 1,000 on higher-end products. However, you can have limitless templates, and each can contain the full number of words allowed by the package.

FOUR VOICE RECOGNIZERS The least expensive of the leading voice recognizers is the VocaLink SRB-LC by Interstate Voice Products, competitively priced at \$395. Vocal.ink is an easy-to-use voice-activated keyboard utility, and nothing else. Unlike other products, it stores its vocabulary directly on the board in its own 128K of RAM. The board also sports LED status lights and includes its own 16-bit microprocessor.

Menus move you through VocaLink's setup and training processes. Once you've completed the training, you can

test the commands in each template for accuracy. (I found Voca-Link to be fairly reliable.) However, the menu system is cumbersome: you have to stick to its figid structure to move from one section of the program to another and do everything from testing how well the voice recognizer understands the tone of your speech to saving the vocabulary.

Unlike more-costly voice recognizers, VocaLink is difficult to embed into custom-written programs. But despite its limitations, it is a good, inexpensive introduction to voice recognition, better

suited for simple applications like DOS or moving through a spreadsheet than for complicated data input.

Higher-priced voice recognizers offer much more and are less time-consuming to use. This group includes IBM's Voice Communications Option board and Voice-Activated Keyboard Utility, Votan's VPC 2000, and the Texas Instruments Speech Library. These fluid, easy-to-navigate systems let users quickly customize any

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FACT FILE

Vocal ink SRB-LC Interestate Voice Products 1849 W. Sequois Ave. Orange, CA 92668 (714)937-9010 List Prices 395 Requires 640K RAM, two disk drives, DOS 2,0 or later. In Short: A basic and sornewhat limited voice-activated keybourd utility that gener-

ates keystrokes from the spoken word.

Texas Instruments Speech Library Texas Instruments Data Systems Group P.O. Box 809063 Dallas, TX 78769 (800) 527-3500 List Price: \$995

Requires: 192K RAM, two disk drives, DOS 1.0 or later. In Short: A full-scale voice-recognition system at a reasonable price. Good documenta-

tern at a reasonable price. Good documentation makes its programming capabilities easy to use. However, unreliable performance is a serious drawback. CROLLEMACONFRACES SOURCE CAND

IBM Voice Communications Option IBM Entry Systems Div. 11400 Burnert Rd. Austin, TX 78758

Ausur, 1A /8/38 (512) 838-8308 List Price: 51,250 Requires: 256K RAM, one disk drive. DOS 2.0 or later.

230 or later.
In Short: An easy-to-install voice-technology board that is required for running the IBM Voice-Phone Assistant, IBM Voice-Activated Keyboard Utility, and IBM Augmented Phone Services, purchased separately (see

next three items).
CIRCLE 667 ON READER SERVICE CARD

IBM Voice/Phone Assistant List Price: \$149

Requires: 275K RAM, two disk drives, DOS 2.1 or later, IBM Voice Communica-

tions Option.

In Short: A sophisticated background telephone manager and answering machine that stores incoming messages on a floppy disk and allows you to change outgoing messages locally or from remote locations.

ORGLE 666 ON READER SERVICE CARD

IBM Voice-Activated Keyboard Utility

List Price: 599
Requires: 215K RAM, one disk drive, DOS
2.1 or later, IBM Voice Communications

Option.

In Short: A disappointing program that allows users to activate keystrokes by voice but is more cumbersome to train and use than

Other voice recognizers.

ORCLE 685 ON READER SERVICE CARD

IBM Augmented Phone Services List Price: \$149 Requires: 448K RAM, one disk drive, DOS

2.1 or later, IBM Voice Communications
Option.
In Short: A unique, easy-to-use speech synthesizer that enables people with hearing or

Speech impairments to communicate over the telephone.

ORCLE 884 ON READER SERVICE CARD

VPC 2000 Votan

4487 Technology Dr. Fremont, CA 94538 (415) 490-7600

(415) 490-7600 List Price: \$1,695 Requires: 256K RAM, one disk drive, DOS

In Short: An easy-to-use keyboard utility and expansion board with which you can customize applications to accept voice input. Has speech-synthesis capabilities. CIRCLE 405 ON PEACOPS SERVICE CAPO. Kurzweil KVS Kurzweil Applied Intelligence Inc 411 Waverley Oaks Rd. Waltham, MA 02154

(617) 893-5151 List Prices 56,500 Regulres: 256K RAM, one disk drive, DOS 2.0 or later

2.0 or later.
In Short: A standalone voice recognizer with a large vocabulary and some significant advantages, including excellent user support and relationships with software vendors.
Drawbacks include a user's marrual that is next to unintelligible and lack of additional

CIPCLE 642 ON READER SERVICE CARD

Speech Plus Inc. 461 N. Bernardo Ave. Mountain View, CA 94039-7461

(415) 964-7023 List Price: \$3,225 Requires: 640K RAM, one disk drive, DOS

2.0 or later.

In Short: A high-powered speech synthesizer, perfect for electronic mail and dispatching applications. CallText converts typed-in AS-CII text to synthetic speech with uncanny accuracy. Not for the technologically faint at heart, this product requires programming

heart, this product requires programm knowledge.

home-made and most off-the-shelf programs to use voice instead of keyboard input. For that reason, these tend to be the voice recognizers of choice in most specialized factory, technical, and inventory applications.

Setup, training, and use tend to be similar for all of these products. The VPC 2000 has an interesting extra feature that makes it a little more useful than the others: when you input the instruction that corresponds to your verbal command during a training that you want the computer to play back each time you want the computer to play back each time you issue that verbal command. in "Check Disk," besides outputting CHK-DISK to the screen, the VPC 2000 can also be programmed to say—in your voice—"I am checking the disk." One acolication

for this feature would be order entry: the computer could verbally prompt the operator to input certain specific information such as order number, quantity, or price.

THE BARGAIN Texas Instruments
Speech Library is, at its \$995 price, the
bargain among full-scale voice recognizers. It's a well-documented, easy-to-use,
full-fledged programming tool that lets

you embed voice-input capability into custom or off-the-shelf programs.

Texas Instruments supplies a microphone that plugs into the back of the expansion board. On a verbal command, the voice-activated keyboard utility directs the computer to type corresponding keystrokes onto the screen. Menus are simple to use and flow well, making it easy and intuitive to get from place to place in the software and to

move among applications. One important caveat: while many users love the TI Speech Library to the price it has a requision for being cranic, and my testing confirmed this. For instance, the diagnostic it displayed an error message that was both cryptic and increet, telling me that the system wasn't working when it was working. During applications, the voice-

recognition system seemed to go
off at unusual times. Some of these problems appeared to be software related, but
others may have had to do with the hardware. In addition, setting DIP switches on
the board is a complex process and not
well documented.

IBM'S ENTRY IBM's voice-recognition board, the IBM Voice Communications Option, is particularly easy to install because the DIPswitches are correctly preset at the factory. A microphone is not included; you can buy your own or use a telephone as your input device.

The separately priced software it runs. called the IBM Voice-Activated Keyboard Utility, allows users to activate keystrokes, by voice. Utilitie most voice recognist, this program is cumbersome to train and structure than the other products do: rather than equating a verbal command with a keyboard command in one list, you have switch back and forth between spara parts of the software and compile two seprate lists.

Votan's VPC 2000, an especially easyto-navigate voice recognizer, lets users quickly customize any home-made and most off-the-shelf programs to use voice instead of keyboard input. The VPC 2000 has two distinguishing characteristics: if programmed to do so, it outputs a verbal nessage to the user after the user inputs a verbal command; and it allows the user to speak in an almost natural, continuous flow of words, avoiding the stilled speech

flow of words, avoiding the stilted speech usually necessary with voice recognizers. The VPC 2000's hardware includes a



The IBM Voice Communications Option board runs separately priced software.

microphone and speaker that plug into the expansion board. The software includes a programming language that lets you work directly with the special features of the board (most packages use a software interface to shield users from the hardware). This language is an asset for experienced programmers but makes the product significantly less accessible to most users.

All three high-end voice recognizers double as sophisticated telephone managers and answering machines (this enhancement to the IBM Voice Communications Option costs \$149; Votan and Texas Instruments offer it as part of their voice-recognition packages). Operating in the background so that they're on call even when you're working on some other application. these devices go well beyond the capabilities of a typical answering machine. Besides delivering a prerecorded message to callers (this is not speech simulation; the message, stored on a floppy or hard disk, is in your own voice) and saving the responses for you to listen to at your convenience. they serve several other useful functions. They keep a running list of the date and time of each incoming call; allow you to stipulate certain memos for certain callers who can access these messages by typing in a code; store a wariety of outgoing messages so that you can instruct the voice-recognition unit to change the selection, even from a remote site; and, on verbal commands, make outgoing phone calls to anybody on your stored directory.

THE KING The Mercedes of the voice-recognition set, at least in terms of price, is the KVS from Kurzweil, the product that Peter Duff uses. Several features set it apart from other voice recognitiens: this shoebox-size external peripheral plugs directly into the PC's RS-232 port, costs 86,500, and can handle a vocabulary of up to 1.000 words.

The most obvious advantage to a larger vocabulary, of course, is having more words to work with. But users who don't need all 1,000 words for one application can use the large vocabulary allowance to

combine phrases covering a few separate programs into a single KVS dictionary, making it far quicker to move the voice recognizer between different applications programs. Moreover, because of its verbal capacity, often several users can share the KVS, each training it to understand his or her own 300 to 500 words.

Still, despite the KVS's hefty price tag, it is mostly a bare-bone system. It has no telephone manager or programming baubes attached to it, and, except for the increased vocabulary, it doesn't perform markedly more easily or better than the TI, IBM, or Votan products, according to Peter Duff and other users (Kurzwiel chose not to supply PC Magazine with a product for testing).

warmed tops the other voice-recognition manufactures in two significant areas. The firm offers excellent support, bincluding a well-manned telephone found and on-site installation help from Kurzweil salestenen, as well as, for \$500, a day-long training session, in addition, Kurzweil has selestenen as well as, for \$500, a day-long training session, in addition, Kurzweil has negotiated partnerships with nearly as and vocabularies for their programs, and that users can mar KVS with those programs without setting up elaborate verhal command structures. Programs included

VOICE TECHNOLOGY

in this group are the database managers Javelin (Javelin Software) and Clout (Microrim); the natural-language filing system Karl (Alexander-Robertson Ltd.); the word processor Mindreader (Program Resources Inc.); and the circuit-design simulation program Verilog (Gateway Design Automation Corp.).

SAY WHAT? Although voice recognizers have come a long way over the past few years, they are still hampered by certain serious performance problems. The most intractable is inaccuracy. Most voice-technology firms claim that their recognition boards can understand their users' commands 95 to 99 percent of the time, but in many environments and situations this statement is more hopeful than true. Different, subtle factors influence how well each product deciphers what it is told. Some voice recognizers, for instance, accepts voice input through a nucrophone and then analyzes it digitally to produce speech patterns. This serreen shows four different ways that the KVS can represent information about one word: (from top to bottom) a votce waveform, a voice spectrogram, an energy contour, and spectral cross sections.

The Kurzweil KVS

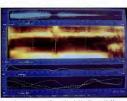


Photo obtained courtesy of Kurzweil Applied Intelligence, Walthour,

understand the male voice better than the | clear voice and others, surprisingly, are

female voice, or vice versa. Similarly, more accurate when the user has a hourse some voice recognizers prefer to listen to a voice. Background noise also severely af-

VOICES IN THE INDUSTRY

Voice technology, while not exactly taking the corporate world by storm, is making itself felt where keyboards aren't practical and where speech synthesis is a boon.

Thile voice technology is becoming more common on the PC, it's not the commonplace PC applications that drive the phenomenon. Peter Duff's use of the Kurzweil KVS may be compelling and dramatic, but word processing is not a typical use for voice technology, except for users who are physically handicapped. In fact, although many voicetechnology firms still claim that soon executives will activate their spreadsheets. database managers, and word processors with spoken commands, most analysts disagree.

"Executives don't want to talk to the computer," says Dan Gooding, director of the Tech-Track Division at the Yankee Group, a Boston-based consulting firm. "A voice-recognition device is no substitute for a good secretary using a word processor.

Voice technology may not succeed in the executive soite, but it is well suited to certain other areas of the corporation. Applications in which entering information manually into a computer is difficult or distracting or in which a talking computer can speed the gathering and dissemination of data are prime candidates. For example:

- The clerk at a refrigerated meat-packing warehouse outside of Chicago wears gloves to keep his hands warm, but when he tries to type information about the arrival and departure of meat into the computer, keyboard errors creep into his work because of the gloves. With a voice recognizer, he dictates shipment data directly into the PC
- At an automobile junkvard in Tacoma, Washington, keyboards wore out every few days because employees with greasy hands were fouling them up as they input descriptions of new inventory. Today, a voice recognizer ensures that the keyboards last while the inventory remains under control.
- Laboratory technicians examining pathology slides through a microscope at a clinic in New York City used to tape-re-

- cord the results and then have them transcribed onto the PC, a system that resulted in constant bottlenecks, delays and inaccuracies. Using voice technology, these technicians dictate their analyses directly into the computer.
- A leading organ transplant coordinating group in Pittsburgh takes calls from organ donors over a computer-answerot line. The computer asks a series of questions to determine the exact nature, identity, and condition of the organ being offered, and the potential donors respond by pressing specific buttons on their touch-tone telephones.

One of the nation's largest appliance

firms, with thousands of salespeople on the road, has set up an elaborate electronic-mail system that relies on speech synthesis. When a salesman calls in for his messages, he types in an access code on the touch-tone phone and the computer "reads" verbaint all the correspondence residing in his cubbyhole of the database.-Jeffrey Rothfeder

fects accuracy. Everything from the machine noise in factories to the hum in aircraft cockpits to the constant clacking of printers in offices can distract the voice recognizer and compromise its ability to understand commands.

To put it simply," says William Creitz of VoiceNews, "for the next decade or two recognizers will have difficulty distinguishing between a door slamming and a voice

saying 'stop.' " There is one way to ensure that you get the most out of your voice recognizer and that its accuracy level is at a satisfactory peak: train the device correctly and patiently. Lapses in accuracy are mostly surmountable by correct training, but one currently irreparable constraint is that you can't use continuous speech when talking into a voice recognizer

Some voice recognizers, notably Votan's VPC 2000, can understand partially continuous speech-perhaps two or three words spoken closely together-but they pay for this feature by being more prone to error. Users, thinking themselves freed from speaking in rigidly stilted prose, begin to lazily slur phrases rather than enunciating them carefully, and the voice recognizer fails to identify their words accurately.

Voice recognizers with larger vocabularies, like the KVS, don't offer even partial continuous speech because it is simply too expensive a research and development effort and would take up too much of the computer's memory to incorporate both functions into

one system at one time. Peter Duff describes speaking into the KVS as "akin to reading a list instead of reading a sentence." But, he adds, "you get used to it, and before long it seems a perfectly normal way to input information.

SYNTHETIC SPEECH Voice recognizers are at the leading edge of voice technology, with speech synthesizers trailing measurably. Their manufacturers apparently hope that the success of voice-recognition devices will draw attention to this related market. Because speech synthesis for the PC is still a slow-moving marketplace. it's essentially the province of one firm, Speech Plus Inc. Its product, CallText 5000 (which sells for \$3,225), converts



Votan's VPC 2000 can understand partially continuous speech.



Speech Plus' Califext 5000 dominates the speech synthesis market.

typed-in ASCII text to synthetic speech. When CallText 5000 speaks, it sounds like an earnest Scandinavian who slurs his words during more difficult pronunciations; voice technologists refer to this voice as the Drunken Swede. But delve more deeply into the features of this speech synthesizer, and your disappointment in its

voice will dissipate. CallText 5000 enables users to design full-fledged computer-voice output systems that are able, with uncanny accuracy, to "read" text of almost any degree of complexity. Varying inflections, shifting tonal quality, and pitch fluctuations can all be built into the

program so that the computer's voice reflects the degree of urgency or softness that you choose. It's perfect for electronic mail or dispatching applications. Be warned, though, that CallText 5000 is not for the technologically faint at heart: it's a complicated utility that requires quite a bit of programming knowledge to use correctly. To preview its features, you can arrange for an interesting demo by calling (415) 969-6257.

Menu-driven software introduces you to the CallText system, then dumps you into a complex programming language. For each new application, you essentially have to create a new program. The documentation that guides you through the process is complicated and dense, and it really is aimed at

programmers

Because of Speech Plus's preeminence in the PC speech-synthesis arena, major firms like Texas Instruments and IBM, which have integrated speech synthesizers into their product lines, have chosen CallText 5000, IBM, for instance, uses CallText as the core of a unique and creative program called Augmented Phone Services (AUG), AUG, which needs the IBM Voice Communications Option board to run, helps people with hearing and speech impair-

ments communicate with people whose hearing is normal by using a touchtone telephone.

When you make a phone call using AUG, the program dials the number. After the phone is answered, the computer says: "Hello, this is Jane Doe, You and I are talking with the help of an IBM Personal Computer because I have a hearing impairment. To talk to me, you will have to press the buttons on your touch-tone telephone."



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VOICE TECHNOLOGY

The telephone conversation then consists of messages that you, the hearing-impaired caller, type on your computer keyboard, which AUG reads and then speaks, and messages the hearing person sends from his telephone keypad (using the symbol keys to help designate letters), which appear on your computer screen. If only a speech impairment is involved, the person called can speak normally into the phone

 Voice technology must achieve some lofty goals, such as continuous speech, if it is ever to enter the PC applications mainstream

while you type your messages on the keyboard, to be spoken by the computer. In addition to this basic calling function, AUG can store a series of emergency messages for phoning the police, fire department, and ambulance, and it also can be used as an answering machine.

Voice technology must achieve some lofty goals if it is ever to enter the PC applications mainstream. Among them are continuous speech capability, decreased user involvement in the training process for voice recognizers, improved accuracy rates, a more natural synthetic voice, and larger vocabularies. But it's this challenging agenda that makes the market so enticing to researchers and high technologists. As Larry Hunter, an artificial-intelligence researcher at Yale University, puts it: "The only way that we'll ever achieve our ultimate aim in computing-to develop a machine that is essentially invisible to the user-is by inventing a computer that people can naturally and comfortably talk to and that can talk back in kind. For that reason, voice technology is literally the key to the future of computers."

Jeffrey Rothfeder is a free-lance writer based in New Jersey.

GENERATORS Give New Life to COBOL

he business community's investment in COBOL applications was recently estimated at \$300 billion. This tremendous commitment to an aging language is propelling software developers to rejuvenate the COBOL-based applications environment. The latest elixirs from the software fountain of youth are COBOL applications generators for the personal computer. Once found exclusively on mainframes, these generators add a friendly, high-level PC interface to COBOL.

A COBOL applications generator translates user specifications into COBOL source code. This code can then be input to a compiler and linker. Typically, the generators prompt you for data and procedures via a set of interactive screens. The resulting applications are not complex, but the source code is a valuable starting place for customized programming and can be created in a fraction of the time that manual coding requires.

These two menu-driven programs that generate high-quality COBOL code from your specifications could help revitalize this aging business language.

THREE CENTRAL FACTORS CO-BOL generators must be evaluated in three areas: how well they integrate and control all aspects of an application, the quality of the resulting programs, and how powerful and ergonomic the generator interface is.

Application control is of paramount concern, especially as the number of files concern, especially as the number of files and programs within an application multiply. A generator must keep track of all files, data elements and relationships, screen mappings, and report layouts in order to create correct applications. A good generator will prevent you from inconsistently specifying any of these items and will also noint out those inconsistencies.

You specify your application to Sourcewriter through a series of menus that guide you in a top-down fashion through the development process.

and show you how to correct them. Forexample, the generator should prevent you from creating a program until every file to be referenced by that program is fully defined. Generators usually use data dictionary processing to maintain control of all applications variables. The dictionary should be capable of fully reporting the development status of an application.

Another important aspect of control is the ability to easily extend and modify the original program. Ideally, you specify the modification to the generator, which creates a new version of the program. A good generator will allow you to specify where local code (that is, maintaily programmed ODO). Code, residently in a copy library, generator) is to be inserted automatically into the program. Without this ability, a generator's usefulness would diminish after initial program creation because you? have to reinsert the local code manually each time the program is re-created.

LOTS OF PERFORM STATEMENTS You can judge the quality of the generated source code in several ways. Well-structured code will display top-down design, with generous use of PERFORM statements but avoidance of GO TO statements. The generator should name generated data items and paragraph labels meaningfully and align and comment code. It should define literals and conditions in the Data Division (where you define all the data you're going to use) and should use tables whenever possible for searching, storing, and retrieving reference information. A generated program should compile cleanly and execute flawlessly.

The types of programs and procedures that an applications generator can create are a good measure of its power. Generators tend to excel in simple record-keeping applications, which involve standard database record maintenance. You can quickly program additions, changes, and deletions of records or data items using generators. Some generators even provide for rudimentary relational processing between two files, and all can create inquiry and report programs. Generators are less skilled at creating detailed edit and calculation code, though simple range checks and date conversions should be available. This limitation means that COBOL programmers won't be made obsolete by generators, though employers should expect greater efficiency from their COBOL warriors armed with generators

armed with generators.

Should data processins funds on COBOL generators? Like all of life's really

glig decisions, the answer depends on what
you want to accomplish. If you are already
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tions exercised.

Micro Focus's Sourcewriter and Bytel Corp.'s COGEN are two leading PC CO- BOL generators (a bird, Ken Or & Associates Sirucarties)PC and COBOL Code Generator, was not available for evaluation). To pat each package through is paces, I developed an application that tasks employees and department and restinilar to the one used to test database amanagement systems for PC Magazine's Project Database II, Volume 5 Number 21.2 As the generators are essentially database engines, the Project Database applications was a good one to bail do not risk and the project Database application was a good one to bail on for this

I evaluated each package's ability to control the development process, generate quality code, and perform in an easy-touse, intuitive manner. Both generators scored high; the choice between them depends on the features you seek and the skills of the intended user. Sourcewriter allows a nonprogrammer to generate applications, whereas COGEN is geared to the COBOL programmer. If you desire sophisticated interactive programs with the ability to relate multiple files, Sourcewriter is the better choice. You'll prefer COGEN if you require highly customized applications or wish to create batch programs.

Sourcewriter

PC COBOL aficionados will not be surprised to learn of Micro Focus's entry into



the generator market. This British firm has consistently led the PC market with integrated software that checks, debugs, and compiles COBOL programs. Sourcewriter, a natural extension of Micro Focus's product line, is engineered to the same high level of performance that characterizes the company's other offerines.

acterizes the company's other oftenings.

Sourcewriter does not try to be a full replacement for COBOL coding. Its purpose
is to generate interactively controlled filemaintenance professional controlled filefil

Before you can generate a program, you must specify the file, screen, and/or report components that the program will reference. The file-definition facility provides a column-oriented screen in which you enter each data item within an indexed-sequential (ISAM) file (a file that not be trictived sequentially or via an index). This facility provides a good subset of COBOL functionality in that you can specify formats, lengths, occurrences, usage, groupings, and key information.

Certain COBOL capabilities, such as multidimensional arrays, conditional variables, and file organizations other than ables, and file organizations other than ISAM, are notably missing from Source-clare simple validation rules with the data times you define. You can specify date, range, and (limited) table-lookup validations or the name of a manually coded sub-routine. You can also describe a derivation for a data item; the lenge can be defined as, for instance, the sum of two other items or longer field. In first five characters of a longer field in the first characters of a longer field.

Sourceviter's most sophisticated feature is its ability to relate files though a file Link facility. Source and target data friel Link facility. Source and target data fries can be linked on a one-to-one or one-to-many basis, using one-way or bidirectoristal links. You can also specify with the cross a mandatory and whether target records are mandatory and whether they should be automatically generated and encoded. The chief benefit of file linking is not a second to the chief benefit of file linking is that you can create screens that dispars as men they one of the samele applications as men time. For the samele applications as men time. For the samele applications as seen time.

Defin plotformers cross 3 APPLICATION SERVICECTOR

DE RESCRIPTION (3 3

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You can customize Sourcewritet applications by choosing file, menu, and procedural attributes from the data dictionary screen. The data dictionary coordinates all aspects of the application.

Coordinate all Augusts of the applications.

File SPENING DATE DATE SPENING COORDINATE COORDINATE COORDINATE SPECIFICATION TO THE SPENING COORDINATE COORDINATE COORDINATE SPECIFICATION OF THE SPENING COORDINATE COORDINAT

Sourcewriset's file definition facility accepts a screenful of data item definitions at one time. Although Sourcewritet supplies the column headings, you can use them to produce rather customited applications. In the column labeled FLAGS, you would specify key and link items. defined the employee's department number as a "link field" to the record key of the associated department file and instructed the application to write a new department record if the department entered on the employee record did not currently exist. Link processing is difficult to write from scratch; Sourcewriter's Link facility saves time and reduces error.

SCREEN PAINTING Programmers with an artistic bent will especially like Sourcewrite's scene painting facility for Sourcewrite's screen painting facility for You draw the format of the screen or report by placing fixed and variable fields on the work screen. You can move, copy, and detect lines at will. For screens, you dispect lines are will. For screens, we have a scook, report and the screen or report for the screen or report for the screen of t

detail lines, and total lines. When you are satisfied with your paintof masterpiece, Sourcewirer steps you through each variable item, asking you to associate a file data item or derivation rule with the variable. Up to five different files can be specified for the screen. Derived variables will show up in the generated program as Working Storage data items, and the step of the step of

Having defined the applications elements to the statisfaction of Sourcewriter's data dictionary, you are now ready to actually create some COBOL code. You can request freestanding programs, or you may choose to divide the application into control and subprograms. In either case, you select the program type (insert, amend, delete, query, general, or report), give the program a name, and in 2 seconds flat you have a COBOL program.

The programs you generate with Sourcewifer are designed to be invoked interactively, through a menuing system. The control and error-handling proceeding involved with interactive processing add considerable bulk and complexity to the generated programs and occasion the first of my two objections to the package's design: the lack of a batch-program facility. You are locked into interactive data entry and program execution with Sourcewriter. If you could create batch programs that could be run without screens, the savings in program complexity would be enor-

My other objection is to Sourcewriter's report generation. I'd like to see the package utilize the standard COBOL Report Writer, especially now that Micro Focus's

compiler includes this facility. The actual code generated by Sourcewriter is first rate, with good structure, meaningful names, and copious commentary throughout. A seasoned programmer should have no difficulty understanding a generated program upon first encounter, and novices will benefit from the exposure to good technical.

I compiled and tested the sample applications programs on Micro Focus's compiler and was delighted with the perfect results. Of course, the application is rather simple, and a full-blown workout of Sourcewriter's capabilities might reveal a bug or two. But, in general, I found Sourcewriter to be a well-integrated, powerful provider of high-quality COBOL code wrapped in an intuitive interface.

COGEN

Bytel helped pioneer the PC COBOL generator market when it introduced COGEN in 1983. Unfortunately, time has not been kind to COGEN. While the basic function-



ality of the package is extensive, using COGEN requires a little patience and a lot of reading in the manual. Still, once you become comfortable with it, you'll find COGEN can create rather complex programs in a short period of time.

COGEN itself is a COBOL application and runs under the control of a COBOL interpreter or animator. Bytel offers customized versions for Microsoft Corp., Micro Focus, and Ryan-McFarland Corp. com-

pilers. I tested Micro Focus's vension.

COGEN is designed for use by a COBOL programmer rather than a general anabyet; you specify data and procedural information in COBOL. The advantage of a gram design and access to more COBOL.

features than you have in a more automatic

generator. But you do have to know what
you're doing because COGEN does not

check whether you've entered ligal data
names or bad syntax. Very few program
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COEN menus are functionally designed to guide you to a specific component of your application. These components allow you to create files, screens, reports, and batch programs. COGEN produces copy elements for each component, which it then integrates into a complete program. You can also include your own manually produced copy element code in the program. Since you are already in your COBOL compiler environment, it is convenient to check and debug your program

as soon as it is generated. You specify data to COGEN via its data dictionary facility. You can select sequential, indexed, or leality file organizations. COGEN allows you to define just about all the various data attributes available under COBOL, including an odit must and level momber. You can indicate whether a field is a primary or alternate key and whether politicals beyon a complex of the complex of th

CREATING SCREEN LAYOUTS CO-GEN's competent screen processor allows you to create customized screen layouts for your applications. You can invoke the program's template feature to read in a text file containing a screen layout, or you can paint the screen intenctively. It's case to specify the fixed and variable portions of the screen layout since COCEN avoids such fancy extra touches as color of blinking fields. You can, however, designate whether the screen is to be erread before display. This feature is important to have if your contractions to there valid the property of the program of t

You associate the variable fields on you painted screen with data items defined in COGEN's data dictionary. COGEN informs you when the data item is undefined and assumes it to be a Working Storage field. You can then specify an edit

■ COGEN is designed

for use by a COBOL programmer rather than a general analyst:

you specify data and procedural information in COBOL.

pattem, computation and validation code, and an error message for the undefined field. You'll want to create error messages for each input field because the COGEN default message "Invalid Input—Try Again" is not exactly a wealth of informa-

After completing your screen designs, you direct COGEN to create the data and procedure copy elements supporting the application's screen dialogues. The generated code will match the unique ACCEPT/DISPLAY syntax particular to the COBOL compiler you are using. I found that this process works well.

GOOD REPORT DEFINITION Report definition is a COGEN strong point. You can select up to nine randomly accessed OK?(YES/NO/DEL/#)

You must use standard COBOL syntax to describe your data items to COGEN's data dictionary. For instance, PICTURE requires you to enter a valid COBOL PICTURE clause, such as 9(4)/99.

- PROGRAM GENERATORS -

RELEASE 6.05

1.FILE INITIALIZER

2. MAINTENANCE PROGRAM 3. INQUIRY PROGRAM

4. REPORT PROGRAM

5.BATCH PROCESS 6.PFOGRAM COPY BINDER

ENTER CHOICE: _

COGEN produces five different types of programs, and its straightforward menus make the process simple. Menu option 6 allows you to "bind" copy files—that is, convert copy elements into in-line code.

theArt



COBOL, programming has just been elevated to an art form thanks to Visual COBOL from mlp. This comprehensive COBOL compiler package gives you mainframe screen management capabilities for your IBM PC. As a result, Visual COBOL turns your color display into a carwas on which you can create professional data entry screens and a very visual user interface.

The heart of Visual ODRG, is an interactive mask editor that concurages an artistic approach to seven design. Be extending, ANSI standards and providing full text editing capabilities, Visual ODRG, allows you to create your own musterpoece using a full patter of foreground and background colors. You can easily more interest of edited fields, create an uniformid number of windows; continued to the control of the control of



once you and me man sources to your screen design, me mask editor automatically preserves your work of art in a separate screen library. At the same time, a WORKING-STORAGE definition is created for your mask. It's that simple.

Visual OfBOL gives you the screen management capabilities you need. It can make the difference between ordinary software, and software that sells. Just as important, Visual CoBOL increases your productivity by saving you valuable time in both the design and coding stages of program devropment. What's more, screen modifications can be done without recompiling the program, so maintenance is an experience of the program, so maintenance is a program of the program, so maintenance is a program of the program.

In addition to providing impressive artistic capabilities. Visual COBOL also gives you high-speed native 8086 machine code. Il lightning quick SOFC, extended CHANNing features, a new interactive debugger, execution of DOS commands, multi-keyed SAM structure, NSC compatibility. GSA verification, and much more. Versions that support XENIX, UNIX, and both the IBM and Novell networks are also available.

Novem newrors are also avairance.

To fully appreciate the screen management capabilities of Visual COROL, you must see it on your own PC. So, for a limited time only, mby is offering qualified COROL programmers the opportunity to receive a comprehensive demonstration disk that inhibitants the receive potential of this powerful compiler. To find out if you qualify for this offer, simply mail the coupon below or call mby is toll-free number.

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CIRCLE 223 ON READER SERVICE CARD

■ COBOL GENERATORS

reference files to augment the data available from the single, sequential master file that drives the report. The report dialogue allows you to move a field from the master file to the key field of a reference file. CO-GEN will subsequently create the code to support this file access.

For each report, you can specify up to nine control breaks, as well as page size and width, report headers and detail lines, and selection criteria. This last feature allows you to bypass those records that fail to meet your selection code, such as employees with incomes over \$100,000, for example. Unfortunately, the generated programs do not invoke the standard CO-BOL Report Writer.

With COGEN, you have the choice of generating batch or conversational programs. This is a particularly useful option because you can avoid much superfluous code by using batch programs whenever possible. Screen manipulation and errorhandling logic are costly in terms of potential maintenance and debugging, and so the batch mode is a welcome feature. The batch update feature allows you to select files and records and to specify the MOVE or COMPUTE details of the update. Other notable features of COGEN are the program's ability to generate sort and file-initialization programs and to convert copy elements into in-line code.

COGEN performed well on the sample employee application tests. The generated code did contain some minor Data Division bugs, which I easily detected and edition of the complex periods with department records through a COGEN dialogue, though the process was more cumbersome than with Source-writer's Link facility.

writer's Link facility.

My biggest reservation regarding COGEN is its somewhat awkward interface.

The COGEN dislogues are not intuitive,
and the package would benefit from the inclusion of help screens and a better manual. Nontheless, COGEN creates wellstructured code in far less time than value of the control of the company of the company

Eric Bank is an independent consultant based in New York.

THE OPEN ROAD TO INTEGRATED ACCOUNTING

A sits name suggests, Open Systems
Accounting Software (OSAS) is an
'open system.' providing a complete set of source code—and almost encouraging adaptation beyond the usual installation procedures. With the release of
Version 3.0, the venerable Open Systems
hopes to increase its already sizable installed base (its users number in the thousands).

The release of this new version of OAS. Onto to be confused with Harmony, and ore family of accounting applications from 1980, includes a Resource Manager, a 1980, includes a 1980, and 19

OSAS's well-designed menus promote ease of use and flexibility. You access the accounting functions by selecting one of several options, which are listed in the order in which you are most likely to use them.

Version 3.0's menu options include programs that convert Version 2.0 files to this newer version. These upgraded programs are written in Business BASIC Extended; their source code is included.

We reviewed the multiuser version of

OSAS installed on one of Novell's local area networks. Most modules function smoothly as standalone applications, but Sales Order Processing, Purchase Order Processing, Time Billing, and Project Estimating require other applications modules.

THE RESOURCE MANAGER The Resource Manager, a utility module, having system housekeeping functions such as essubtishing the mem system (see Figure and must be installed before you can use any of the other modules. When course pears on the right side of the screen men pears on the right side of the screen men pears on the right side of the screen men consistent throughout all the modules. Serves as an excellent road map to orient you within the system.

The Resource Manager is used to install the other applications modules—a well-controlled and simple process that ensures that you copy the correct files from the disks provided with each module. Each module requires about 600K bytes of hard disk space for program and table files. Data file size depends, of course, on your business activities.

One of the more important housekeeping functions "sizes" the data files for each of your applications. To size a file, you answer questions about your expected transaction volume, number of customers, number of employees, or other key accounting data. Reviewing file size; an ongoing maintenance task, ensures that your



The latest version of the popular Open Systems Accounting Software adds new features and modules and retains one of the system's biggest assets: a complete set of its source code available for customization.



Figure 1: The Resource Manager's main-menu approach is used throughout all the other modules. When you choose a menu option, the new menu appears on the right side of the screen and the previous menu on the left.

system will have sufficient room to create the necessary records. Unfortunately, no system message warns you when you are approaching the file limit, and you obviously cannot continue processing if there is no room available in the data file. You must first remedy the situation by adding the necessary file space.

Another Resource Manager function places designated passwords on any menu option in each module. The system does not require that you use passwords to control access to the menus, but passwords can be useful for establishing proper accounting controls.

A customization feature lets you edit the menu system and add your own programs. You can change the order of any menu, reword the captions, or install a custom menu option. For example, you could add a month-end reporting option that would print all your reports while you performed other duties.

Open Systems allowed us to see its newest version, Resource Manager, Version 3.1 (scheduled for release this year). This revision addresses three main concerns: ease of data entry, error control, and performance in a larger system environment.

When this revised Resource Manager is used with transaction entry screens, pressing the Tab key invokes the windows feature and displays a box with a list of possible values (such as account codes). When you seroll down the list to the correct item and press P to proceed, the value is automatically added to the appropriate field on your screen. Pressing K and any character will start the list with items beginning with that character. For example, if you enter K4 for an account number, the window list will begin with account codes starting with the number 4. Thus, you can easily customize the window by changing its size and location. More important, you can display other data items in the window to cross-check them against the information you're entering. We expanded the customer 1D window for the Enter Invoice screen to show the customer's balance over 120 days and the customer's credit limit. When selecting fields, you have access to and can truncate any field in the key record.

Version 3.1 will reduce file access times when more than one accounting module is installed by creating a separate directory for each module. The current version of the Resource Manager puts all programs in one directory.

GENERAL LEDGER The general ledger is the core of any accounting system, keeping you in touch with the pulse of your business. Attention to detail in planning your chart of accounts structure will make it easier to produce the financial information you need to operate your business. OSAS offers a number of ontions.

As is typical with general ledger systems, you must first establish three elements: company 1Ds, charts of accounts, and fiscal periods. You must define each "company" in your organization by creating a single-character company 1D. A company can be a division, region, department, or separate business organization. Each company is an entity with its own individual chart of accounts and fiscal periods. If you interface the General Ledger with other OSAS modules, you can define as many as 35 separate companies; if you use the General Ledger as a standalone system, you can have more than twice that number. A chart of accounts can have up to 12 characters in the account number. and you can use 13 accounting periods per year or quarter and access any period at any time for adjustments.

At the Chart of Accounts entry screen, you enter the company ID, account ID description, account type, current- and prioryear opening balances, and budget information, as well as a "clear-of" account and a "consolidate-to" account. The unique clear-to account feature automates year-end closing procedures; consolidate-to account automates the process of consolidating the ledgers of multiple financial entities.

Although you can define your own unique chart of accounts, OSAS does not go quite far enough in facilitating modern fameal reporting. The account number is, in exerce, a single element. Many cool into two or more subelements. For example, one element is typically set saids for department or division. Even though you can structury our christ of accounts to get around this limitation (such as by using at round the similar than the control of the control

You can set up ten groups of recurring entries, each identified with a unique "run" code. The run code allows you to

post the groups as needed throughout the period. Although that is a convenient feature, OSAS does not offer standard or reversing journal entries that allow quick transactions.

The General Ledger Journal entry screen is quite simple to use: you enter the company ID, entry date, accounting period, and a source code to indicate the origin of a transaction (for example, M for manual and P for payroll), a description (25 characters), reference (8 characters), and the initial General Ledger account code. The source code can later be used to print selected journal entries and is included automatically in General Ledger entries from other applications modules. Edit controls prevent you from posting to nonexistent accounts.

The program computes the balance as you enter each line of the transaction and prompts you with the necessary debit or credit to halance the entry. On-screen messages will warn you if you attempt to enter an out-of-balance transaction, though a

The Price Waterhouse Team



G. William Dauphinais is a management consulting services partner in the Sacramento. California, office of Price Waterhouse and has lone been a regular writer of and contributor to The Price

Waterhouse Report.





Timothy J. Lee is a manaoement consulting services microcomputer coordinator in the Price Waterhouse national office in New York City.

password-override function will let you enter and post entries that are not balanced.

The General Ledger module provides the standard reports and can generate customized reports. In addition to the General Ledger Journal and General Ledger Activity Report, you can generate a list of your recurring entries, your chart of accounts. and a trial balance to review individual account balances.

Designing custom reports will be much easier if you have a well-structured chart of accounts that is designed with both your reporting needs and the capabilities of the system in mind. The system comes with a number of predefined income statement and balance sheet report formats that can be easily copied and then modified.

You create custom reports using two sets of instructions, one for the columns (up to 15 columns on a report) and one for the row formats. This approach lets you define a single report format and use it for different organizations. For example, you might specify columns of data for actual. budget, and variance on an income statement. By designating the company ID when selecting a report, you can use the same print specifications for different companies.

Reports can be printed, displayed on the screen, and sent to an ASCII file or to a 1-2-3 worksheet file. Until we installed the Report Writer, we were not able to successfully print to a 1-2-3 file. We were able to use the 1-2-3 and ASCII files to import the data to a Javelin model file to produce custom reports quickly, which is a nifty feature.

SALES ORDER PROCESSING Integrating the Sales Order Processing module with the Accounts Receivable, General Ledger, and Inventory modules enables you to display inventory levels and customer credit balances on-line while taking an order. With good judgment, you can avoid unnecessary back orders, delays, or unauthorized extensions of credit. When integrated with the Inventory module. Sales Order Processing helps maintain proper stocking of items and back orders, imposing a greater degree of control over sales and shipments.

To initiate Sales Order Processing, you need to establish two master files; the cus-

 A customization feature lets you edit the menu system. You can change the order of a menu. reword the caption, or install a custom option.

tomer file and the ship-to-address file. The customer file includes a customer ID (6 characters), customer name (30 characters), three address fields (25 characters each), phone, salesperson code (3 characters), credit limit, tax code, account type, terms code, finance code, and amount halance fields. The ship-to-address file includes the customer ID, ship-to code (2) digits), customer name, three address fields, and a ship-via field (20 characters). You can store up to 99 different shipping addresses for each customer ID. Using a unique ship-to code for a customer during order entry will automatically fill in the ship-to-address and ship-via fields. Unfortunately, there are no separate ZIP code or city fields, which would allow you to print labels in ZIP code order for discounted

mailing rates or targeted marketing. To enter sales orders, you first enter and approve header information. The software then prompts you for the line item detail of the order, which includes the item number, inventory category code, tax code, general ledger codes (specifying the sales and costof-sales general ledger account numbers), quantity ordered, unit of measure, quantity shipped, and price (see Figure 2). For serialized inventory, the system presents a 35character field in which you enter the unique serial number of the product. This number retrieves the item's cost and price and prevents you from selecting any items that have been committed to another, unposted invoice. After you approve and post the invoice, the items ordered can be removed from inventory. In addition to inventory line items, you can add freight and miscellaneous charges to the order.



Figure 2: The Sales Order Processing module's order entry screen shows the detailed information necessary to create orders. The system automatically calculates extended price and tax. For serialized inventory, it prevents you from selecting items committed to another unposted invoice. In addition to inventory line items, you can add freight and mixellaneous charges to an order.

After you enter the order, packing slips can be generated and used by warehouse personnel to fill the order. If warehouse personnel note items actually shipped on the packing slip, the document can be used to verify what goods were actually shipped. This may include the unique serial numbers of goods shipped or notation of items not available in the warehouse (perhaps because of shrinkage or damage) that were thought to be in inventory. This annotated nacking slip could be used to revise the invoice and show the change in back-ordered items. Once shipments are verified, you can print invoices. OSAS does not prepare individual bills of lading or packing slips, but you could print a revised packing slip for these purposes.

The Sales Order Processing software is designed to provide useful management information. For example, the open order report allows you to generate reports cautining only the information that's important or pertinent (see Figure 3). You can select a unique group of orders by customer ID, warehouse ID, item/job number, or order status and then sort those orders by customer ID, warehouse ID, item/job number, or order status. Such summaries

can help you draw conclusions about efficiency in the stockroom, proper stock levels, and quality of individual items. For instance, you may wish to increase your

■ When integrated with the Inventory module, Sales Order Processing helps maintain proper stocking of items and back orders.

inventory levels or change pricing for certain items that show up continually on back order. If an item is frequently returned, you might consider replacing or discontin-

uing it.

Proper use of sales order reports helps anticipate inventory trends and requirements. Customer analysis and sales history reports furnish information to determine

your high-profit customers, your best salesperson, or a product's contribution to profit.

protit.

We were impressed by this module's focus on management information. At the same time, we were flustrated by the fact that only one receivables general ledger account is used to link Sales Order Processing to the General Ledger. In certain business environments, this limitation could diminish the effectiveness of your receivables reporting.

ACCOUNTS RECEIVABLE The Accounts Receivable module functions well as a standalone application. When integrated with the Inventory module, it updates inventory records as soon as you approve line items on the invoice.

When you install Accounts Receivable. you are given several options for defining discounts, finance charges, taxes, and account coding for sales. You can define nine different discount terms for use in invoicing customers. A finance charge percentage can be established for each company to calculate and assess finance charges on overdue customer balances. Nine sales tax percentage codes can also be predefined. Eighteen pairs of general ledger account number combinations, which can be established to book sales and cost of sales. are specified on each invoice line item to allow for posting of your financial accounts. This approach represented a constraint to one of our clients; we purchased a commercially available modification to extend this limit to 99, enabling our client to record sales and cost-of-sales amounts in specific categories or departments.

You must enter customer and ship-toaddress information before processing transactions, just as with the Sales Order Processing module. In addition to the previously mentioned customer data fields, the customer master file contains codes that include one for salesperson, tax rates. payment terms, and finance charges used during transaction entry. As with most comparable accounting systems, you can maintain customer accounts by using either the "balance forward" or "open item" accounting method. If you choose balance forward, you will be applying payments to a single total balance due from a customer, whereas the open-item method

applies payments to specific invoices. Open-item customer balances are updated after posting (usually daily), while balance-forward customer-aging balances are updated after month-end processing.

INVOICE TRANSACTIONS If you install the Sales Order Processing module, the system automatically generates invoices for Accounts Receivable. Three types of invoice transactions are recognized by the system: credit sales, cash sales, and credit memos. Invoice header information calls for the customer ID. salesperson, terms, customer order number and date, ship-to address, shipping number, and shipping date. Using the Invoice Detail screen, you then enter the line items of your order, including a tax code and general ledger account combination code. If the quantity shipped is less than the quantity ordered, the dollar amount of back-ordered items is calculated and displayed. Total sales tax is automatically calculated from the tax code you supplied and is displayed after you enter each line item. You can also enter freight and any miscellaneous charges to the invoice.

The Cash Receipts screen is simple and effective for recording payments received from customers, as well as for recording noncustomer receipts and applying prepayments from customers who have not been billed. After entering the customer ID and the check number, you can apply a payment against a specific invoice or account. If you use the open-item method, the system will display information from the customer's file, allowing you to select the applicable invoice. With balance-forward-type accounts, you can select one of seven aging "periods" to apply the payment to. A period can include the oldest balance, the unpaid finance charge, or the current balance.

Sales history is maintained for each customer, including sales, gross profit, and number of invoices for the current period and year-to-date. You can generate customer statements that summarize your customer accounts, and you can add dunning messages, such as "Your account is 30 days past due," to the statement. You can define four such messages based on current and 30-, 60-, and 90-day parameters. The system has a hold-or-release func-



Figure 3: Using the open-order report screen, also from the Sales Order Processing module, you can sort orders by customer ID, warehouse ID, item/job number, or order status and then generate reports based on the resultant unique group of orders.

tion that allows you to put certain invoices on hold so they won't appear on the customer's statement. No finance charges are assessed against a held invoice, but it will continue to be aged. Credit memos and

 The customer and invoice inquiry functions allow you to quickly assess the status of a customer's account and open invoices.

cash receipts can also be held. The customer and invoice inquiry functions let you quickly assess the status of a customer's account and open invoices. A word of caution, however; since balanceforward customer files are undated only after month-end maintenance, your aged trial-balance report may not agree with the aged balances in your customer file. This may pose a problem when you need to make a decision while viewing data online during order entry since the aged amounts in the customer master file will reflect only the value from the last time month-end maintenance was run.

In addition to the standard accounts receivable iournals and reports, the system provides other useful management information. The cash flow report lists the amount due from customers for any four dates you specify. The sales history report determines your best products, customers, and sales representative. This report can be sorted by customer ID, salesperson, item number, or product category. The customer analysis report gives you sales, gross profit, number of invoices, and other pertinent information for each of your customers-a valuable analytical tool. You can also produce mailing and shipping labels for invoices, statements, announcements, and shipments.

ACCOUNTS PAYABLE With the Accounts Pavable module, you can process vendor invoices, prepare debit memos for returned goods, print checks, and employ on-line inquiry into vendor accounts. To install Accounts Payable, you establish a

■ THE PRICE WATERHOUSE REPORT

vendor master file that includes, for each vendor, a unique vendor code (6 characters), name (30 characters), three address fields (25 characters each), one phone number, terms days, amount due, amount prepaid, and purchases history. Additional fields for name of vendor contacts and additional phone numbers would be useful.

Entering vendor invoices is a simple process. You supply the header information, including the vendor code, warehouse ID, invoice number, invoice date, and purchase order number. Since the terms for each vendor are stored in the master file, the system automatically calculates due dates and discount dates.

Once you approve the header information, you enter the invoice detail along with the associated general ledger account distribution. The system will calculate a cash discount and a due date based on the terms specified in the vendor master file. The discount and any prepayment are deducted to arrive at the amount due. For making installment payments to a vendor, the system allows you an "unlimited" number of installments and calculates the corresponding due dates. Once you have entered your purchases, you can print the purchases journal, which provides you with an audit trail of all recorded purchase transactions

For each payment cycle, you enter a specific date, and il invoices the on or before that date will be selected for payment. This process is disappointing and limiting. Comparable systems offer several options; for example, you can select for payment all invoices eligible for discount, or you can choose all open items either for a vendor or for certain invoices.

You can review and edit the invoice list and make partial payments, hold invoices, or release invoices for payment. After selecting invoices for payment, you can print checks. A predefined check format is available.

The Accounts Payable module offers a variety of reports, including an open-invoice list, check register, vendor analysis, and cash flow report. The vendor analysis report can determine which vendors give you the best discount or suggest that you negotiate discount terms with a frequent vendor. The cash flow report allows you to project your cash outlays for up to three dates that you supply to the system.

INVENTORN Open Systems Inventory module can effectively help you manage inventory levels and costs by tracking inventory levels and costs by tracking inventory in separate warehouses, transfering stock from one location to another, and tracking both serialized and nonserialized items in inventory. Each item is signed an inventory ID (up to 20 characters), a user-de-frined category, a bin mather, a price code, a reorder point, the wendor codes for vendors that supply the time, and the vendor item number for each time, and the vendor item number for each

■ Since Open Systems makes the source code available, a network of independent system developers who customize the software has formed.

of those vendors. Three inventory valuation methods are available: FIFO (first in, first out), LIFO (last in, first out), and average cost. When used with other modules, the system maintains the date of last purchase and the date of last sale.

The module is flexible enough to allow you to make gross price changes (by percentages) of all item categories or items within a specific category. This feature is particularly handy when conducting temporary retail sales or markups and mark-

Inventory adjustments can be entered to adjust quantity balances after a physical count for obsolescence and shrinkage. The adjustment log has an audit trail to document these changes.

Inventory reports include an inventory status report and a detailed inventory report for each item in stock. The "alert" report points out items that have fallen below the predefined order point to avoid stocksuts. The price list and sales analysis re-

port can be used to analyze your pricing structures, and the evaluation report depicts individual year-to-date item sales, costs, and profit margin to help in determining the profitability of your inventory investment.

OTHER MODULES Additional OSAS modules include Report Writer, Payroll, Purchase Order Processing, Fixed Assets, Human Resource Management, Job Cost, Time Billing, and Project Estimating.

Report Writer designs custom reports from your accounting data, using up to six different files per report-an impressive capability relative to comparable systems. Payroll is a quite extensive system that provides the necessary interface with Job Cost, Purchase Order Processing tracks orders from purchase to receipt of goods, including returned goods. Fixed Assets can link to the General Ledger to manage your capital investments, and it includes a leaseversus-buy analysis for decision making. Human Resource Management can generate certain reports required by government agencies and track information on employees' salary grades, position codes, and salary histories. It also includes a skills inventory of your employees to help you locate people with the right skills mix.

Job Cost allows you to prepare bids quickly and track the activity of subcontractors, payroll, materials, equipment, and overhead costs for individual jobs. Time Billing is designed to handle the accounting chores for a professional services firm. Invoicing, time and expenses, and work-in-progress reports are some of the features of this module. Project Estimating requires the Time Billing and Accounts Receivable module; it utilizes Time Billing information to provide more-complete project reporting. Materials Management, when released, will interface with the Inventory module, allowing you to schedule and track all components from raw materials through subassemblies to finished goods.

Since Open Systems makes the source code available, a network of independent system developers who customize the soft-ware has formed. Some have even created other, complementary modules. Open Systems has recently published a directory with information enabling you to contact



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Average Cost Basis

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Remorts

. Capability for Hourly, Salaried or Commissioned on Weekly, Biweekly, Semimonthly, or Monthly Pay Periods. Optional After the Fact Payroll

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■ THE PRICE WATERHOUSE REPORT

 An improper entry sequence may drop you

out of the program and into BASIC

these software developers. The company's policy of providing development tools to these independent developers, including standards for the source code, increases the viability of a customized approach.

DOCUMENTATION AND TRAINING OSAS documentation consists of individual manuals for each application, including the Report Writer and Resource Manager. Although on-line help is not available, the printed documentation is well planned and executed. Each manual offers you lessons with sample data for hands-on experience, installation instructions, and operating instructions. Each contains the available screens and reports and describes the meaning of each system prompt as well as checklists, data entry worksheets (he sure to organize your data before creating master files and system tables), and a section with system messages and suggestions for corrective action. However, you'll need a BASIC language interpreter manual to understand the reasons for BASIC program error statements. Two particularly useful sections include a list of commonly asked questions and answers and a glossary of terms with references to the chapters and sections where each is introduced.

Open Systems conducts installer training, which includes 4 days of intensive classes. User training is also available at \$195 per day; all the modules are covered in 3 days.

Open Systems could improve upon its cumbersome method of editing data fields. For instance, it would save keystrokes if you could edit within fields. Instead, before you edit an existing entry, you must type C to completely erase the previous entry before you begin typing. You can type beyond the length of the field on the screen

without receiving an error message. Even more distressing, an improper entry sequence may drop you right out of the program and into the BASIC language command level. Our concern is apparently shared by other OSAS users; we understand that Resource Manager, Version 3.1, will address this problem

OSAS's strengths lie in the depth of its functionality, the breadth of its family of applications, and-above all-the opportunity it gives you to customize the software if you find this necessary. We would advise against unnecessary modification of the software, but if your business practices are unique, you may find that the customization option makes all the difference.-G. William Dauphinais, Terri C. Connor, and Timothy J. Lee



er, Version 3.0, \$195; Xenix 3.0.

Accounting Softwa Version 3.0 Open Systems Inc 6477 City West Pkwy. Eden Prairie, MN 55344 (612) 829-0011 List Price: Reso

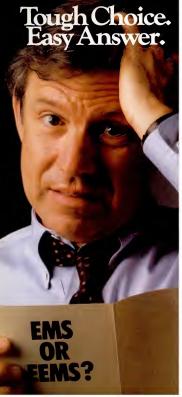
\$295; UNIX V, \$895; Networks (Novell, 3Com. or IBM's PC Network): 1-3 user \$695; t-10 users, \$895; 1-24 users, \$1,795. Resource Manager, Version 3.1, with win dows, \$295; Xenix 3.0, \$395; UNIX V. \$995; Networks (Novell, 3Com, or IBM's PC Network), 1-3 users, \$795; 1-10 users, \$995: 1-24 users, \$1,895. Accounts Rece able, \$795; Fixed Assets, \$695; General Ledger, \$795; Payroll, \$795; Inventory, \$795; Sales Order Processing, \$695; Purchase Order Processing, \$695; Human Resource Management, \$895; Job Cost, \$695; Time Billing, \$995; Project Estimating, \$395; Report Writer, \$595.

Requires: Resource Manager, Version 3.0, 256K RAM (1 Mbyte for Xenix or UNIX), 360K disk drive (10-Mbyte or larger hard disk recommended; 20-Mbyte for Xenix or UNIX), 80-column printer that can print 132character lines; DOS 2.1 or later (DOS 3.0 for Network)

In Short: A fully integrated and flexible accounting system. The company provides the source code, making third-party customi tion an attractive option. The entry/edit facility is cumbersome. Not copy protected.

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PUTTING YOUR **BUSINESS ON** THE MAP



There's more to business graphics than pie charts, bar graphs, and reports decorated with icons, Sometimes, nothing says it better than a customized map.

of potential buyers. The shortest, least treacherous route. The richest territory. The most favorable climate. The best-situated location. The most-populous sites. Maps can do more than show you how to get somewhere; they can also interpret an area for you. Interpretive or thematic maps, which use data like population, income, and sales statistics to analyze the characteristics of an area, have helped

area with the greatest number | cation succeed since Babylonian times, when people first used maps to record land ownership and assess taxes.

You probably used your first interpretive maps in grade school, when you glued a cotton ball to Alabama, a piece of coal to West Virginia, and some cereal to Iowa or colored the most-populous countries of the world red and the least-populous vellow. The interpretive map is an essential business, government, research, and education business, government, research, and edu- tool, both for analyzing information geographically and for presenting it in a way that people can readily graps, Some typical uses of interpretive maps are to analyze rade areas, identify sites for locations, target marketing areas, design sales territories, monitor sales performance, allor advertising expenditures, plan communities, and analyze traffic patterns. Maps can enliven business presentations and communicate complex information faster and with more impact than any other graphic tool.

NEW SOLUTION Until recently, businesses and other groups that needed to present analytical or descriptive data with a geographic relationship had four choices: use charts and tables created with a spreadsheet or database program, sacrificing the advantages of colorful, easily understood maps; employ a graphic artist to depict data generated with a spreadsheet, database, or outside data supplier, adding time and expense to the process; use an expensive mainframe or minicomputer system involving special programming and oftenslow turnaround time: or hire a mapping service bureau, also entailing high cost and time, in addition to depriving the group of the chance to modify the maps as they're created. PC graphics programs gave them another ontion: analyze data with a spreadsheet or database and outline a map with a graphics package, adding labels and symbols to convey information about the areas mapped (see sidebar "Mapmaking with Graphics Packages" at right). But with the advent of dedicated mapping software for the PC-a new niche of business-presentation graphics that in some cases also offers data analysis and editing capabilitiesbusiness, government, research, and education groups can now quickly and easily create and present vibrant, full-color, persuasive maps that show pertinent demographic and other statistical information.

The applications of PC mapping programs are numerous and varied. Insurance companies use them to decide where agents are most needed across the country. Banks use them to choose the best locations for automated teller machines. Admost every activity they're involved in, including depicting television and radio advertising regions like areas of dominant interest (ADIs of designated market areas

MAPMAKING WITH GRAPHICS PACKAGES

In addition to charts, graphs, diagrams, and flowcharts, these four graphics packages also create maps.

You may already have a program in-I house that will create maps for your business presentations. The following four highly rated graphics packages include outline maps along with their other shapes. They won't put interpretive data on the map as the standalone mapping programs do so effectively, but you can add symbols and labels to describe your information. If all you need are some basic, good-looking maps for business presentations, marking sales and service territories or the locations of plants or branches, for example, these programs can handle the job as well as your other graphics needs-charts, signs, diagrams, forms, flowcharts, logos, and so

Diagraph from Computer Support Corp. of Carrollton, Texas, is a fast, polished, easy-to-learn graphics package (reviewed in "Diagraph Sets the Pace for 'Business Quality' Graphics," PC Magazine. Volume 5 Number 6). This popular program has a U.S. maps library that includes low-, medium-, and high-resolution maps of the 50 states. Diagraph allows you to combine states into sales regions and territories and to add labels and legends using high-resolution, solidfilled typefaces. You can place symbols from an extensive symbol library anywhere on the screen and then move. stretch, compress, rotate, flip, and mirror them. Many other features enable you to change and enhance your maps. Then you can display, print, and plot them in full color or by shading states and regions using any of the 54 available shading patterns. Diagraph, which retails for \$395, comes with over 2,200 symbols and 13 typefaces, and you can order optional symbols, typefaces, company logos, and custom libraries. It supports a wide range of printers, Hewlett-Packard plotters, and 35mm image recorders.

Freedunce, recently acquired by Loss Development Corp. from Graphic Communications of Waltham, Massachusetts, and a 1986 winner of a PC Magazine Award for Technical Excellence, includes maps of the 50 U.S. states along with its more than 150 symmotis. The package offers as wide range of graphics features that let you create impressive presentations. Freedunce's case of use and 1st ability to import ASCII text and 1-23. PIC fifts for charting are its main selling points. It comes with mouse and 1-23 pIC fifts for charting are its main selling points. It comes with mouse 150 cm. The communication of the property of t

VCN ExecuVision from Visual Communications Network of Cambridge. Massachusetts, also creates maps and also sells for \$395. Our reviewer called it the "Cadillac of presentation graphics" (see "Business Graphics: Giving Power to Presentations" PC Magazine, Volume 4 Number 12). With ExecuVision's International Atlas library (1 of 19 graphics libraries offered by VCN at \$90 each. with discounts for multiple purchases), you can create a sales-by-state presentation. The program enables you to color particular states and print text within them. You can also highlight towns or districts within a state. You can enter your data from scratch or, if you buy the \$75 EV Capture module, capture a screen while running another applications program.

A new psekage from the same company, VCN Concord (suggested retail price, \$695, including complete image database, \$350, with trade-in of VCN Executivisor manual) offers fully integrated capabilities in both medium and high resolution for business graphics, high-quality text, free-hand screen paining, animation, and self-numing presentations. It plots tailored graphs directly using data from 1-2-3. Symphony.



FACT FILE



Computer Support 2215 Midway Rd. ort Com Carrollton, TX 75006 (214) 661-8960 List Price: \$395; U.S. ps. \$99

Requires: 384K RAM, IBM Color/Graphics Adapter, IBM Enhanced Graphics Adapter, Tecmar Graphics Master, Hercules Graphics Card, or the HP Multimode graphics board, 8087 math coprocessor chip recommende for increased speed and performance, DOS 2.0 or later. Supports a wide range of printers and plotters.

In Short: An interactive business gran package that enables even novice users to quickly create a wide variety of professional looking presentation aids, organi charts, forms, flowcharts, di and word charts; U.S. Maps library includes maps of all 50 states that you can combine. color, shade, and label. Copy protected. CIRCLE 830 ON READER SERVICE CARD



Freelance Lotus Develop Corp. 200 Fifth Ave Waltham, MA 02254 (617) 890-8778

List Price: \$395 (Graphwriter, \$395; extended version with additional chart types,

res: 256K RAM, two disk drives. DOS 2.0 or later. Supports IBM Enhanced Graphics Adapter and standard IBM and ales cards, Microsoft and Mouse Systems mice, and high-quality plotters and

In Short: A powerful package that generates sophisticated business presentations and enances existing 1-2-3 graphs; comes with a library of over 200 common images, including the map of the United States and maps of each state. Not copy protected. CRICLE 628 ON READER SERVICE CARD



VCN ExecuVision Visual Com Network Inc. 238 Main St Cambridge, MA 02142 (617) 497-4000 List Price: \$395; libraries. \$90 each

Regulres: 356K in medium resolution, two disk drives, monitor with color graphics adapter, DOS 2.0 or later, Supports mice. digitizers, tablets, and many standard plotters

In Short: A highly rated business graphics software program that lets you combine multiple text fonts, business data, charts, graphics, and pictures for presentations; you can choose prerendered images from additionalcost libraries or create original images. Copy

LE 626 ON READER SERVICE CARD VCN Concords



Visual Communications Network Inc. 238 Main St. Cambridge, MA 02142 (617) 497-4000 List Price: \$695, including complete image database: \$350 with trade-in of VCN ExecuVision

sires: 348K RAM in medium resolution, 640K in high resolution, two disk drives, CGA- and EGA-compatible gray board, DOS 2.0 or later. Supports mice, digitizers, and tablets and many standard plotters In Short: An impressive state-of-the-art inte-

grated package that produces business graphics, high-quality text, free-hand screen painting, animation, and self-running ation; comes complete with a da base of over 2,000 professionally drawn icons, symbols, and images, including maps. Copy protected.

Multiplan, and DIF-format spreadsheets. All text is proportionally spaced with 15 high-resolution and 15 medium-resolution fonts available, each of which you can scale, tilt, shadow, color, or underline. You also get a full painting capability with multiple-level zoom, choice of 64 colors, unlimited patterns, and complete scaling. Mouse support is included. The animation function allows for the dynamic illustration of any concept, and you can create your own animations or use the animation library that's included. -Carol Olsen Day

(DMAs), designing direct-mail campaigns, and helping to plan new products for certain consumer groups. Retailers use map programs to determine franchise locations and shipping routes. Manufacturers are analyzing market share and examining distribution channels with PC-based map programs. City planners use them to assess future water consumption in communities and plan transportation and school systems. Political groups analyze voting patterns and party affiliation with map programs. Research groups are using the programs to analyze outbreaks of disease and to study environmental changes. Schools and universities are using them to train students in ecography, engineering, sociology, architecture, city planning, and so forth. Nearly every business, government, research, and education group that uses PCs can now take advantage of mapping software to convert dull, complex data into attractive, communicative maps.

WHAT YOU'LL NEED To use most PC mapping programs, you'll need a PC with a display monitor and a graphics card (color capabilities are strongly recommended, and a hard disk will, of course, make things easier), a pen plotter (sometimes a dot matrix printer will suffice), and both boundary files and data files.

Boundary files are what the programs use to draw geographical features like country, state, and county outlines, city limits, ZIP code areas, and so forth. The boundaries of these features are stored in the file as a series of x, y coordinates or latitude and longitude points. The software draws the map boundaries by connecting the points to make polygons that represent geographical areas. Some boundary files usually come with the software, but to create custom areas, you'll need to alter the packaged files by combining areas or zooming or exploding (see the glossary of terms that accompanies this article), purchase additional files from the vendor, or input the coordinates yourself (a possibility with three of the programs reviewed here-surprisingly, the two most basic programs and the most complex one) by digitizing the areas by hand or with the aid of a digitizing tablet, mouse, or light pen-(not supported by all programs).

Data files contain statistical data with a

geographic component: the number of residents per square mile, the average income per household, the number of widgets sold, the number of residents over age 50, and so on. You can purchase data files from the software vendor, export them from a popular database or spreadsheet program when using four of the five programs reviewed here, or, with two of the programs, input the data by hand, creating your own files. The programs show the data by color shading the areas, using dots to represent units of data, or assigning a pattern of characters or hatches to the areas and by showing a legend that gives the ranges of the data variables displayed. Since most businesses are more likely to have the data they need on hand than they are to have the boundary information, many find it convenient to buy boundary files and create their own data files.

WHAT TO LOOK FOR PC manning software runs the spectrum, from inexpensive programs that have low memory requirements, can use your printer to draw maps, and require you to enter your own coordinates for boundary files to those that cost more, require more memory and equipment, and offer sophisticated dataanalysis and display features. Features to look for include flexibility in manipulating data and data ranges; the ability to add features like store locations and highways to a map, to label points of interest, to zoom in and focus on a small area, and to add text to a map. More-advanced programs will easily import data from a spreadsheet or database, print out tabular reports of your data, offer a range of colors and patterns, let you combine areas, store your maps for easy display in a presentation, and support a device like the Polaroid Palette, which can make slides from your screen images.

Another important consideration is the availability of data and boundary files that fit your needs. When evaluating the cost of additional files. ZIP code files from one work of a cost of additional files. ZIP code files from one work of, for example, can range from \$195 for a particular state to \$5,000 for the entire builted States. You'll also want to analyze your needs in terms of staff available to of the mapping, what data you already have on hand, and whether your needs are maintained to the proper of the property of the property

for data analysis and presentation on a more frequent schedule.

The following five programs range from the no-frills, do-it-yourself type— MAPIT and Polymaps—to the more expensive, everything-automated type— Map-Master, Randmap, and Atlas AMP.

■ When evaluating the cost of a program, you'll want to consider the cost of additional files.

MAPIT

Raymond J. Kalush of Questionnaire Service Co. in East Lasning, Michigan, created MAPIT about 2 years ago to fill the meeds of low-bedget institutions and small companies. His inspiration for the program came, when he was working at a gram came, when he was working at a wanted to map subscribers by ZIP code and could find no suitable package for the PC. Kalush went to work, taking many of his ideas for MAPIT from Harvard's SY-MAP and the Laboratory for Computer Complete's CAPFORM, both mainframe

packages. The result was MAPIT. Kalush has done a fine job of creating a no-frills mapping program for use by notfor-profit groups, local government agencies, schools, and laboratories for both analyzing and presenting geographic and statistical data, and perhaps even for business for analyzing data on hand, but MAP-IT's output cannot measure up to the slick graphics the more-expensive programs can produce. Its output would look fine in a proposal from a not-for-profit organization but not very competitive in a presentation from a Fortune 500 firm. Nor will maps you create with MAPIT look comparable on your monitor's display screen with those of some of the other programs.

The standard medium for MAPIT maps is the printer. The program is designed to print a map on one page. Even though you won't be able to see the entire map you plot on one screen, a few screens will unveil it

(exconfiguring using MCONFIG will let you see the map on one screen, but that will give you less resolution on the printed map, a medium resolution one-current dismars, a medium resolution one-current dismars, a medium resolution one-current dismars relaxed.) You don't need expensive quipment like a plotter to use MAPIT—your printer will do the job—but you!! have to rely on hard copy to see the finished product. Kalush has enhanced the nexest version of the program. however, of potents and compatibles, and plotter outputs its very presentable.

MAPIT can create four types of maps: outline, conformant, interpolative, and trend surface. An outline map is what it sounds like-simply the outline of the area or areas you're mapping (all the programs reviewed here can give you outline maps, as can the graphics packages mentioned in the sidebar "Mapmaking with Graphics Packages"). A conformant map, also called interpretive by some of the other programs reviewed here, displays different regions with different symbols. This type of map is the one that most mapping programs are designed to create, to represent various demographic and statistical information; one difference is that MAPIT represents the data with keyboard symbols like periods, asterisks, and dollar signs, whereas the more-expensive programs use colored hatching and other patterns.

TREND SURFACE MAPS MAPIT also creates interpolative and trend surface maps, which use a scale system to represent all the positions on the map. In an interpolative map, the symbols do not change abruptly at the borders of the areas within the map; rather they are smoothed out across the borders according to the given scale. A trend surface map looks similar to the interpolative map, but the changes in detail are much smoother because a mathematical equation in addition to the scale determines the patterns. A trend surface map is often characterized by a smooth shading that starts deeper at one point and fans out, progressively lighter, in a geo-

metric shape like a parabola, for example.

MAPIT comes with files and coordinates that enable you to map Africa, Asia,
Australia, Canada, Europe, South America, the United States, and the various

MAP PROGRAMS



You won't need a cohorgraphic cond or cohor monitor to use MARTI, but you can plot maps in cohe if you till. Fe was one also speed; the size of you map out and praider on map with a which carries get printer or plotter, as long as you don't exceed 250 flines coross. The principal medium for MARTI to the printers not be symbols that are care the patients you not range; the s., the, plus sign, the greater than sign, the color, and the period. Full state manes rether than just two better descriptions of the size of the

countries and states within them. An appendix supplies the ASCII decimal/character equivalents you'll need if you want to change the default characters MAPIT uses as symbols.

MAPIT is a no-frills program: no fancy menus direct you, but you do get a help summary, as well as prompting at each command level. The program includes no tutorials per se, but you don't really need on—the examples in the well-written manual are very clear and easy to follow. Installing the program is a cinch. Creating map outlines by using the files included with the programs is also easy.

To create a may fleannes, area names, and more a may fleannes, area names, and numbers, with which you "program" a map. For example, get, cumper, may/france, a would give you the map of France from the file that contains the coordinates for Europe, which MAPIT supplies. Here we're using the Get command, which retrieves data and outlines from a file; the filename europe, map, and the area

name france. Additional commands would determine the type of man, the data to be shown, the lablet, and whether to show the map on the screen or to print it. To add data to this map, you of use the Data command to this map, you of use the Data command gross national product, which you must input yourself since MAPIF supplies no data files. The other programs reviewed here an import data from programs like 1-2-3, Symphony, or dBASE; with MAPIF, supplies no data distanced to the data whether statistical or boundary-related—you'd have to do the importing by hand, typing it no reaking it importing by hand, typing it no reaking it making it makes the state of the s

from a fie created with your editor. While this system is not as filek as those of the more expensive programs, the faci is you'll probably have to enter or import your own data no matter which program you use, unless you pay for additional files. And MAPIT's system gives you control over your input; you can decide to spell out state or country names. for example, whereas in the preparkage doundary files for the other programs, you'd get automative.

ic labeling that would be a two-letter code. You can incorporate whatever clites or geographic features you need to show. You can also add vertical and diagonal labels—a nice touch—and choose the scale and the symbols to emphasize the point you're trying to make with your data. Plus, you can choose the dimensions of your mans.

Another way to input with MAPIT is to use a command file—the preferred way to show most maps. You would use an editor to type the commands into a file and the commands in it. That way, when you've gone to all the effort of creating a map, you can easily access it on file for editing or reprinting.

A THUSY BUSINESS Creating maps of your own in trivity, though, If you need to map an area for which MAPIT does not have a built in fill or does not list have a built in fill or does not list have a built in fill or does not list have a built in fill or does not list have obtained you're conceidinates (this will almost always be the case unless your needs are very simple and not clies, sales serritories, ZIP code areas, and so froth, you'll have to do what the clearly written and easy-to-follow—but again nor liftilis—MAPIT manual calls "a fair





Questionnaire Service Co. P.O. Box 778 East Lansing, MI 48823 (517) 641-4428 List Price: \$95; manual.

List Price: \$95; manual, \$10; U.S. County Oute database, additional \$95 equires: 128K RAM, one floppy disk

drive, IBM compatible primer or plotter, DOS 1.0 or later. In Short: MAPIT offers an interesting and capable program with few demands on your system and your wallet but heavy demands on your time and effort. Its output can 1 macit

on your time and effort. Its output can't match that of the more expensive programs, but MAPIT can open the world of PC mapping to schools, not-for-profit agencies, and individuals who need to analyze data geographically—at the right price. Not copy protected. GRELE WARD OF SERVICE CAPO

■ MAP PROGRAMS

amount of work." MAPIT sells a database of outlines of all the counties in the United States, except for those in Alaska and Hawaii, for 595. But if you want to map another area with MAPIT, you must input pairs of numbers (the x and the y coordinates) that correspond to each point on the outline of your region, or, in other words, digitize the area.

You can digitize by hand or with a digitizer. But no matter bow you do it, entering all the coordinates for your custom area (unless it's a simple polygon with only a few points) involves a lot of time and effort. Since MAPT doesn't have a neditor, you'll have to use your own (actually a bomost since you wouldn't want to learn another one anyway to enter the data into your system. How go, enerally need to your your system. How areas, adding different data to we maps, you can save the mapped as a in

a file tous egain and again.

MAPIT's low price, clear manual, and its adapability for use with only 128k bytes of RAM, one disk drive, and a printer make it attractive for use in the classroom, by community agencies, and by coal political or civit groups. And if you it reinterested in interpolative and trend surface maps and don't mind inputting a lot of coordinates, you'd low anto take a look at one of the coordinates, and the coordinates who the coordinates in the coordinate in the coordinate is produced to the coordinate in the coordinate in the coordinate is produced to the coordinate in the co

Polymaps

Another inexpensive software program that can use your printer to produce interpretive maps has been available for more than a year and a half in its PC version and for more than 4 years in its Apple version: Polymaps, from Community Research & Information Systems. With its roots in the mainframe system called DIDS (Domestic Information Display System), which is based in Washington, D.C., and runs on a VAX 11-780 with about 1,000 different databases, Polymaps was created by Thomas Curtin for groups that need maps lacking standard geography and that can't afford an expensive program with the added expense of customized files.

You can also use Polymaps to produce bar, line, and pie charts, using the same The printed maps

Polymaps creates look
somewhat slicker than
those of MAPIT, and you
can also produce very
presentable plotted maps.

data you use for mapping. The printed maps *Polymaps* creates look somewhat slicker than those of *MAPIT*, and you can also produce very presentable plotted

Polymaps, which comes with a system disk, sample data disks, and an installation disk, runs as a sequence of menus from which you select an option like Polygon Create/Edit by pressing a function key or as a set of freestanding programs you can execute from the system disk without execute from the system disk.

ing through the menus. Installing Polymaps is easy; you simply follow the screen prompts, responding appropriately to questions about your hardware setup. The main menu appears automatically after you use the AUTOEXEC command on the installation disk.

WALK-THROUGHS The program's offari-quality, amazeurish manual needs improvement. Polymaps's vendor should acke a look at MAPT's documentation for a model of how to organize and present information clearly on a low budget. "Excutured walk-throughs" take the place of a tutorial or a step-by-step guide, but original programment of the pr

To use Polymaps, you must create databases of your customized mapping information, including statistical and boundary data. The program comes with a database of the boundaries of the U.S. states, as well as some sample statistical data. You can also load external data files from programs like Symphony. Since



You can generate Polymago, maps with a dot manic printer, but here's what output from a platter locks like, with the three colors indicing the three ranges, which appear table dwish numbers only in the upper-right-hand corner. The areas of the country are "exploded," separated into four geographics divisions. State abbreviations have been added automatically, and a comment about the gainst in Florids is used to add information.

\$2000? That's Too Darned High!

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Community Research & Information offers a free user-donated library, you may find that you can map many other areas without much effort on your part, too. But as with MAPIT, you'll have to enter the coordinates of your own customized areas, unless you ask the company to customize special files for you at additional cost. The "geo definition" process, or defining the areas you want to map, involves three steps: identifying how many geographic units you want to define (for example, six sales areas, 14 neighborhoods, 52 ZIP code areas, or 110 census tracts), determining a coordinate system for your digitizing process (reducing a map to a list of numbered x and y coordinates that represent its outline), and actually digitizing the map. As the manual notes, when dealing with a large map, you may need to spend 8 to 16 hours to complete the geodefinition stage. Many of Polymaps's sales are to universities, where teachers want the students to learn how to create maps this way: businesses may find it takes too much time and effort unless someone on their staff already has learned the skill.

MAKING POLYGONS To create a map.

you first choose Polygon Edit/Create. The system prompts you to make sure that you have a formatted disk for a new data file in your disk drive and that you have the x and y coordinates for your polygons ready. When you give the go-ahead, Polymaps shows you the command menu for Polygon Edit/Create, from which you select the appropriate mnemonic single-letter command. If you're creating a new map, here's when you'll enter the values of the x and y coordinates for each polygon and choose whether you want to view the polygons normally or zoomed. When you print or plot the map, you can see how it looks and compare it with the actual area you're mapping. If adjustments are needed to make it appear more detailed and thus more realistic, you can adjust your coordinates, most likely adding more levels of definition. When you're satisfied with your polygons, you can save them for future use and, more importantly, add statistical data that will make them interpretive maps rather than simply outline or spatial maps. You can also zoom and explode with Polymans.



To add data for mapping and creating chart and tabular output, you select Data Entry/Data Management. You can enter the data by inputting it through the keyboard, computing it from existing data, loading it from external sequential files, or, of course, editing and deleting it once it has been loaded into the Polymans database. None of these tasks are really difficult, but the manual is sometimes so vague at telling you how to proceed at each step that you start to wonder whether you should instead hire someone to analyze your data geographically and then enlist an artist to draw the maps.

If you can find someone who's experienced with the program to lead you through building interpretive maps (maybe you could even get someone to do the dirty work for you-compiling all the coordinates needed to turn rough polygons into a realistic map), you may eventually find Polymaps to be a valuable business graphics tool. The output looks good. You can use it to create pie, bar, polybar, line, and scatter charts, as well as to interpret your data geographically, and the price is right. But factor the time and effort you'll spend against the price-you may decide you can afford one of the slicker, more-expensive packages on the market. With a better

manual (which Curtin says is coming soon) and a few improvements, though, Polymaps could contend with some of the higher-priced packages.

Map-Master

A new entry into the PC mapping software market, Map-Master is a sophisticated, elegant addition to Decision Resources' series of graphics programs that create customized charts, signs, diagrams, and now maps. Map-Master comes with more data than most mapping programs, at no extra cost-information to map the United States by state, including 1985 population, retail sales, age, and income statistics. Also included in the package, to whet your appetite for the many additional files that are available, are files to map Louisiana by county and Manhattan by ZIP code according to various population, age, and income statistics. But to create maps of your own customized areas, not included in the boundary files that come with the program, you'll need to purchase additional files from Decision Resources.

The Map-Master package includes four program disks and a boundaries and statistics samples disk. The copy-protection scheme includes a hard disk install and uninstall option. Using a hard disk with the program increases mapping speed, but you



TURNER-STEVENS, INC. FIRST QUARTER SALES BY STATE



Map-Masset's plotted map showing sales by a particular company for the United States has tree ranges with a legent, range title underlined, and cure symbol to indicate regional offices. The regions are exploded and labeled as well. Note the row-line title and the different size type. Map-Masset can also use different typefaces and add from sa well as use titalies. No state names are given there, but the program will add the two-lette address viations if you have.

can also run Map-Master on floppy disk drives; in that case, the program prompts you to insert the necessary disks in the correct drives as you select a new operation.

Map-Master, which is menu-driven, is easy to use and reassuring. The program automatically stores each component as you create or edit a map. Prompt lines at the bottom of each screen tell you at a glance how to make an entry or a menu se-

Even if you've never used a PC program before, you'll find Map-Master's well-designed, sep-by-step manual easy to follow. It starts with the basics, telling you how to create subdirectories when you install the program on a hard disk and even discussing what you need to know about using the IBM keyboard and how to deal with floppy disks. Plus, the glossary explains important technical terms—from alnhammeric to zoom.

The manual also clearly describes the parts of a map and different types of maps. Map-Master maps can have one or two levels of geographic boundaries defining regions. The United States by state, for example, is a one-level map; the United States by county is a two-level map, with the first level being the state boundaries and the second level the county bound-

aries. Installing Map-Master is straightforward and easy. After installing the program, you're greeted by Map-Master's main menu. It and subsequent menus tell you how to create a new map; edit a map and its data, title, or legend; plot a map on screen, printer, plotter, or film recorder or change the plotting options; retrieve or delete stored maps for editing or plotting or erase them if no longer needed; use Map-Master's DataGrabber to bring data into a map from a spreadsheet or database file; print a list of the data values stored with each region in a map; and reconfigure hardware, initialize a map storage disk, copy a map, or install or uninstall boundaries and statistics files on a hard disk.

5-MINUTE TUTORIAL Creating a map with Map-Master is simple and quick. Map-Master is cludes a 5-minute lesson that illustrates each of the steps and gives

you a feel for how to create and plot maps. Then you're on your own: the reference section of the manual, arranged with topics in alphabetical order, gives you all the help you need.

To enter data, you retrieve a copy of a map you've created and, with the main menu displayed, select Edit Man, You'll then be shown the Editor menu, from which you choose Data. To select a set of variables from one of Map-Master's libraries, for example, you choose Select/ Load Variable Set from the Data menu. Map-Master then displays the screen that lists the variables stored with the map and their sources. You indicate the variables, such as population, you want mapped and then calculate variables at this point by dividing one by another; for example, to select per capita income, you'd divide income by population. You can also enter variables manually at this point.

Say you want to show the location of a corporate headquarters and regional sales offices. First you would retrieve a stored map or create a map and then edit it by choosing the Edit menu from the main menu: Man Layout, Labels, and Symbols from the Editor menu; and Map Labels and Symbols from the Map menu. When the Labels and Symbols screen is displayed. you'd use the cursor movement keys to position the cursor where you want to add labels, symbols, or lines and follow the onscreen directions. You can mark the locations of the headquarters and the offices with symbols from the Map-Master's Basic Symbol Set, which includes nine commonly used symbols (x; open circle, square, and triangle; plus sign; closed circle, square, and triangle; and line). You can also use the additional 94 symbols and icons in the Symbol font (including, for example, car, plane, stop sign, phone, boat, money, sun, arrows, math symbols, and so on). Then you can add labels and draw lines to the locations. You can also specify up to 16 different sizes for symbols and text; choose italic or roman; center, left justify or right justify, underline, and print or plot them in any one of eight colors. The various graphics presentation options are what make Map-Master shine.

Map-Master is flexible, too. It lets you set the number of ranges you want shown in a map and the lower and the upper limit

ZEROING IN: IMPRESSIVE POSSIBILITIES





Projected completion date: May 1987





Whether you're using plots made with a high-quairy plotter like those from Hewlett-Packard or slides made with a 35mm-film recorder like the Polaroid Palette, you can create some colorful, expressive maps to

the Polarist Polaris, you can creat some cologial, expressive impass to displaying and an interest some cologial, expressive impass to displaying and an interest polarist polarist polarist interest to print the impass with Map Master would be boundary, likes for the world and sour road first quarter receives for the international afficies shown. To pright: This Alsko AMP polarist hades highways, shows to the new lates, and a criter in the international afficies shown. To pright: This Alsko AMP polarist hades for either amount an example received as criteria international and an international polarist with a superior than the print and sure This project of even amount an example received as a superior for a sure in print and an international polarist polarist

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MAGUNE				-	
	MAPIT	Polymaps	Map-Master	Randmap	Atlas AMP
Price	\$95	\$99	\$395	\$495	\$449*
Memory required	128K	256K	348K	256K	320K
Requires hard disk	5		Recommended	Recommended	Recommended
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DUTPUT DEVICES			1		3
Supports plotter for output			•	•	•
Ises printer for full map output	•	•	•	•	91
Supports film recorder		●, 1	●.4	●,1	in new release
Screen display	No [†]	•	•	•	•
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Sorts data			•	•	•
Reports	•	•	•	•	•
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Different fonts			3	ŝ	In new release
cons			94		In new release
Footnotes	/- 100		•		
Control over text options			by character		by letter
LEGENDS AND RANGES					-
No. of ranges	30	10	8	10	20
Replaces range labels with text	30			. 10	20
Dot-density maps	•				:
Does bivariate maps		•		•	•
No. of hatch patterns	N/A	14	8	4+	300
No. of colors	30 (plotted)	8	8	10	16
	an (hiouse)	. 0		10	10
BOUNDARY AND DATA FILES				9	
includes boundary files	•	•	•	•	•
Offers additional boundary files, extra cost	•	•	•	•	•
Approximate price of some typical files	\$95-\$150	\$100-\$150	\$95-\$195	\$200-\$495	\$500-\$1,050
includes data files Offers additional data files, extra cost	• populations only		•		No**

for each range. You can customize the legend heading. And the program allows you to combine standard geographic regions into custom regions that meet your specific needs; for example, your sales territory.

Map-Master's DataGrabber makes loading data files from a spreadsheet program like 1-23 desay. You can display and then grab all or part of the spreadsheet, load it into Map-Master, and then store it either with a map or with a variable library. Then you can use the data to map an area.

■ Map-Master is an attractive package with an intelligent yet easy-to-master approach to mapmaking for business presentations.

Once you've got all your data on the map, Map-Master offers options for positioning and sizing your maps, printing re-ports, printing maps on a graphics printer and on a plotter, and creating 35mm color slides using the Polaroid Palette. The manual even includes fips on slide making and instructions for loading film and shooting slides with the Polaroid Palette.

FREE NEWSLETTER When you put a chase a copy of Mag-Master, you get a free subscription to Decision Resource's newsletter, Graphili. Much more than just a public-relations ploy, the newsletter is an excellent resource to help you improve your business graphics. A recent issue gave full-color examples of maps created with Many-Master, hints on improving agree full-color examples of maps created with Many-Master, hints on improving question-and-annews exceiton, and in innouncement of a new thermal-transfer printer for business reachies dequented printer for business reachies dequented.

Map-Master's helpful menus demystify complex technical concepts with its down-to-earth language. Its easy-to-use features give you a wide range of options to create customized maps with all kinds of

data. And its well-designed manual is easy to use and informative. Perhaps what makes it even more desirable as an all-around mapping program is the fact that it includes, without evan cost, enough data for you to map the United States by number of population, age, income, and sales are of population, age, income, and sales included to the properties of the properties o

a bead start. Man-Master won't do bivariate mapping, where you include two different types of data on one map, and it lacks some of the more advanced data analysis and reporting features of its chief competitor, Atlas AMP. Bivariate maps aren't that much in demand, however, and Map-Master does perform conditional combinations of data. And, although you can't digitize a customized boundary file on your own, as you can with Atlas's MapEdit program. you can make custom regions quickly, as A.C. Nielsen, one of Man-Master's customers, does, by combining areas from boundary files. So if you are satisfied with your database and spreadsheet for moreelaborate data analysis and reporting, don't mind paying extra for the boundary files you need, and want a solid, presentation-oriented mapping program that's easy to use, you'll find that Map-Master is an attractive package with an intelligent yet easy-to-master approach to mapmaking for business presentations.

Randmap

Rand McNally means maps. You've been timing with the company's maps all your life—from large pull-down classroom maps that captivated you in the fifth grade to detailed road maps that helped you wend your way through little known byways across the country. Using its 130 years of expertise with maps to the fullest advantage, Rand McNally has produced Randmap, a direct but more capable descendant of its Stamp mapping program.

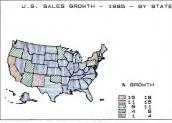
Totally menu driven, Randmap is easy to use, even if you're new to the PC. In minutes you can install the program and begin creating and modifying brilliant full-



It's pretty much a tie: The two best PC mapping programs are Map-Master and the Atlas AMP/ExpressMap combo. Atlas AMP, with its add-on MapEdit boundary-editine program and its built-in Data-Edit utility, offers the most when it comes to customizing your boundaries and analyzing your data, and its new version promises to add more features like icons, additional typefaces, and film-recorder support. These aptians are already available with Map-Master, which alsa has to its credit its ease of use and its clear, good-looking manual (not to mention its lower price). But Map-Master lacks some of Atlas AMP's flexibility and power. Output from both pragrams laaks great. The one you choose depends on how your needs far boundary and data files match up to what the vendor affers and haw far you want to go with inputting your own boundaries and editino data

If your main concerns are ease of use, excellent dearmentation, impressive appearance of autput, and lawer price (to both the pragram and its additional-cost files), you wont to go as for as possible with date analysis and banadary editing, you want to go as for as possible with date analysis and banadary editing; you adde on modules. The ExpressMap macros will make it easy to use when handling runtime engrowking chores, and DaitaEdit will (14 you perform some sophisticated done

Honarable mention goes to MAPIT (which earns a gold star for its clearly written manual) and Polymaps for caring about the budgest of small businesses, schools, and nat-far-profit graups, even though the program can't yet campete with the big guns.



This Randmap plus places the United States to the side to accommodate the range legend. Note the five ranges, which two only at tile and not set description to the Side. The regions are not expluded because Randmap does not include that option. The map title is only one line long here, but you cause there le nited is Jou with. State masses or obbrevious or not added anomalically, and so they do not appear here. Zooming is on aption, and you can also flip maps on either or both axes for better viewing a the screen.

color maps. But Randmap is not as flexible and full-featured as Map-Master and not as powerful and fast as Atlas AMP. Its new \$495 price rescues it from the ignominy of being the most expensive PC mapping program on the market (it previously was \$995, sometimes discounted to \$795).

The Randmap package includes the main program, a utilities disk, and a files disk. The utilities disk contains the Rand-cat and Coords programs, which, respectively, catalog and then redisplay images created with Randmap and enable you to add new coordinate files for use in selecting specific geographic areas for mapping, as well as the device drivers for use with mice, printers, and adapters. The files disk transcription of the desired programs of the desir

FEATURES Randmap, like Map-Master and ExpressMap, comes with boundary files of the U.S. states. Data options enable you to alter the minimum and maximum values in your map and to reset the number of ranges to correspond to the number of data value ranges you are mapping. Plus you can choose the method of widring data into ranges. Renthmey lets you use a saved range file and choose among several methods of dividing data into ranges. Although you can use only choose integer or decimal values for the data, enter names for range legends, use the cause of the consecting of the consection of the conse

As with the other programs, you have a unmber of options when choosing the data for your map. Rand McNally may supply the data you need in one of its data files the data you need in one of its data files the data of the data of the data files of the data files of the data files for a grant data file, with a single data field for each est of geographic codes. You can also use a BASE If data file or a DIF (Data International Formath III) be you've created with the data files of the data files of the data files of the data for the data form one of the above as geography, a data from one of the above as geography.

map legend, or as an optional line printer report.

CLEAR MANUAL Installing Randmap is fairly quick and easy since the manual takes you through the process step by step, even telling you how to create the necessary subdirectories on your hard disk and informing those new to computers how to care for floppy disks. The manual's 46 pages of tutorial material show you how to begin using Randmap's features. The clear explanations of Randmap's basic features. which experienced users might take for granted, demonstrate that Rand McNally wants the manager with no previous computer graphics experience to be able to use Randmap fast, with assurance, and with little effort.

After installing Randmap and configuring the program for your equipment, you can create a new map or edit a cataloged (or previously created and stored) map. Randmap has four catalogs that you can use to store your files: map specifications, data files, coordinate files, and image files. You can edit the first three types of files from the Update Catalogs menu.



· ·

Randmap Rand McNally & Co. P.O. Box 7600 Chicago, IL 60680 (800) 332-RAND or in IL. (312) 673-

List Price: \$405 Requires: 250K RAM, PC-XT or compatible with 10-Mbyte hard disk, one floppy disk, of the recommended, graphers and patter and mentium resolution codes video monitor or monochrome monitor, asynchromous commencations and agree or standard RS-232C (cércial) port and a printer adapter (in adduct to a compatible plotter or printer). DOS 2,0 or

In Short: Rondmap, mapping speculish Rand McNally's new product for the PC mulet and offspring of Statinaga, is quack to learn and easy to see but lacking in some of the more advanced features. Its output lioks, good, but unless your bundary Jatta needs much Rand McNally's file offerings precisetly, you'll probably want more flexibility, Not copy proceeds. Some of your options include extracting existing polygons to create a new coordinate file, merging two coordinate files, and flipping the coordinates in a file on the x or the v axis.

You edit the fourth type, image files, using the Randcat Catalog Image Presentation System program. Similar to a photograph, a Randmap image file can be stored in a catalog so that you can then redisplay it at any time or assemble it in a slide show.

NOSTALGIA Randman is easy to use and quick to learn. The manual is clear and good-looking, but an index would make it more helpful. The program can produce good-looking interpretive maps fairly quickly, but it offers less in terms of flexibility than Map-Master or Atlas AMP. It doesn't have an explode feature, icons, or italics and different type sizes for map titles. It doesn't have the advanced dataanalysis features of the other two programs. But its additional boundary filescoming soon (fall 1986), for additional cost, of course-are tantalizing, including major lakes, rivers, and reservoirs; roads and highways; national forests and parks; Indian reservations: wildemess areas: and so forth. And if you're impressed by Rand McNally's 130 years in the mapping biz or feel nostalgic for your grade-school geography classes, when the world was smaller than it is today, you may want to request a demonstration of Randmap.

Atlas AMP

As the core of the powerful ExpressMup system from Strategic Locations Planning (SLP), Adias AMP (for Advanced Mapping Package) has many contented users in business, academic institutions, and government planning departments to its credit. In fact, it's the basis of Dun & Bradstreet's BusinessTrace, which allows marketing managers to access data from Dun's databases and then map the information map the information.

On the market for about 2 years now. Altas AMP is the best-known mapping package for the PC—and one with the most names to learn before you bush there's Adas AMP for \$449, ExpressMap, for \$499, which includes Altas AMP: DataEdit, the data editor, free with any of the packages: MapEdit, the map boundary editor, for \$249 (\$100) off if purchased

with one of the packages); and WorlData, which also includes Atlas AMP, for \$900. Wisely, SLP has developed a shell, or front-end, for its new version (September 1986); although PC Magazine hasn't seen it yet, the new user interface should make it easier to move from one program in the system to another.

If you are looking for a serious mapping program that gives you a lot of power and flexibility, need detailed data analysis as well as graphics capabilities, and are willing to put in some time getting to know all the features—you'd do well to explore Ar-las AMP. It has pretty much everything the other packages offer and more.

Allas AMP is function-key driven and has a function-key template to help you remember the primary uses of the keys. The program is really not as user friendly as it could be—until you add ExpressMap, which includes Keyworks, a powerful key-board macro program from Alpha Software.

The maps you create with Atlas AMP are very impressive; lots of features, flexibility, and choices give you great-looking maps on the serven and in hard-copy out-put. One difference in the way Aldas AMP maps look on the severen is that the map covers the entire serven; with the legend and ranges shown on another. When you print the map on a plotter, though, you'll age them both on one page. Although, Audia AMP doesn't offer as many options for large them to the one page. Although Audia AMP doesn't offer as many options for large them to the compact of the contract of

U.S. BOUNDARY FILES Allas AMP concess with some sample files plus boundary files for the United States, ExpressMen and Files Boundary files for the United States, ExpressMen and Express and Express



Total U.S. Sales were up by 14% in 1985!

Pleased on a New Serv. New love the hope quality pleaser, this way shows some of Alba NAPS a pooled afforcers, mothably the eightly round commons of a round in the major to some uniform the subset of the sites of the major. The legend, which shows the ranges, also has as this Regions at a line at the hotime of the major. The legend, which shows the ranges, also has as this Regions will depend to the control of the sites of the sites. The legend will be shown that the legend to the sites of the legend to the sites of the legend to the legend t

Glossary of Mapmaking Terms

ADI Area of Dominant Influence. ADIs are marketing regions developed by Arbitron Ratings Co. and used primarily by the television industry. You can purchase ADI boundary files of the United States for mapping with data.

Boundary file A computer-readable file containing the outlines of geographic regions, usually designated by r., y, or latiude and longitude coordinates. Mapping software uses these boundary files to draw maps. Some vendorts sell customized boundary files as well as standard ones. Interpretive maps require both boundary and data files.

Census tract A unit defined by the U.S. Bureau of the Census for gathering demographic data, usually including 2,500 to 8,000 residents, with homogeneous population and housing characteristics when established. You can purchase boundary files based on census tracts.

Data or statistics file A computer-readable file containing demographic regions. Abel file containing demographic regions. Each category in a data or statistics file is called a variable, examples of which are population, median age, and total movement of the concentration of the containing and data files. Venders of PC mapping programs usually self data files for use with their programs but also allow you to tenter or import your own data.

Digitizer or digitizing tablet A device used to generate a boundary file by physically tracing a paper map.

are its cities and highways, U.S. counties, and countries of the world files.

DataEdit enables you to display your own data and edit data from SLP. It takes DIF and Itat ASCII data files from programs like 1-2-3, VisiCade, and dBASE II and III and then outputs an Adias AMP data and format file. The manual goes so far as to tell you how to create Ita files with dBASE II. DataEdit also lets you calculate new variables using formulas and encerate. DMA Designated Marketing Area. DMAs are marketing areas developed by A.C. Nielsen Co. and used primarily by the broadcasting industry. You can purchase DMA boundary files of the United States for majoring with data.

Explode The process of separating designated sections of a map from each other with white space to show more clearly the relationships or characteristics of certain areas. A useful feature of most mapping programs.

LATA Local Access Transport Area. LATA maps are perfect for showing telecommunications industry data. The United States has 195 LATAs. You can purchase these boundary files for mapping with data.

MSA Metropolitan Statistical Area. MSAs are groups of counties that encompass a densely populated area. An MSA may encompass a large city or one or more small cities. The United States has more than 300 MSAs. You can purchase MSA boundary files and data for MSAs for mapning.

SMSA Standard Metropolitan Statistical Area. SMSAs have been replaced by MSAs as the most current definition of metropolitan areas in the United States.

Zoom The process of enlarging a portion of a map (zooming in) or of shrinking the map (zooming out). A useful feature of most mapping programs.

-Carol Olsen Day

data reports with summary statistics. It's one of the most powerful features of the Atlas AMP/ExpressMap system. You can even use it to search and sort your data as you would with a database program, and it enables you to not only import your data from a spreadsheet or database, but to export it as well.

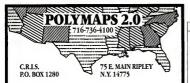
But remember: you still need boundary files with coordinates of the territory you want to man and display your data on. You

could create your own boundary files in ASCII format, but that could involve more time and effort than is practical, unless you're a mapmaker par excellence. The way out that most bouncess users choose is very out that most bouncess users choose is SLP (which specialties in geographic data analysis for macking and strategic planning) and to create the data files they need themselves, especially since most companies will already have much of the data they need.

BOUNDARY EDITOR But if you do want to create or modify boundary files for use with Atlas AMP, you'll need SLP's ManEdit. This boundary editor makes Atlas AMP more powerful and more flexible but also more complex to use (its manual is about the same size as that for Atlas AMP itself). Using a joystick, a mouse, a digitizing tablet, or the cursor keys, you can customize Atlas AMP boundary files to meet your specific needs by creating your own files or by modifying boundary files purchased from SLP. As SLP warns you in the MapEdit manual, MapEdit is a complex program; you have to read two chapters and work through a 21/2-hour tutorial just to get started, and you must be familiar with using Atlas first. Yet after a few hours of using the program, you'll find that it's an excellent tool for mapping your own territories and for customizing map colors, patterns, and position, as well as adding such features to your maps as circles indicating distance from a point, roads and highways, and sites. MapEdit also offers region aggregation and explode features.

SLIDES UTILITY Atlas's Slides utility program is another handy feature; it allows you to store previously created maps and display them on your screen as an electronic slide show for demos or presentations. The new release will also support the Polaroid Palette, as Map-Master does, and other film-recording devices.

I personally wouldn't want to use Atlas AMP without the built-in macros of ExpressMap. I'd like to be able to escape a procedure quickly, too, without having to wait for Atlas AMP to put all the state names on the map when I've decided that I don't really want them. Also, I prefer



With Polymaps you can produce custom color maps of your area. perform statistical analysis and prepare business graphics using your data. Output your maps to screen, plotter or printer for an effective

presentation.

"Polymaps is an excellent tool for business analysis, marketing and government planners and educators."

It is simple to use, the documentation is clear, and it is a good value at \$185.00. Creative Computing Magazine

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■ MAP PROGRAMS





Atlas AMP, Version 1.1 Strategic Locations 4030 Moorpark Ave.,

San Jose, CA 95117 (408) 985,7400 List Price: \$449 mcludes DataEdit, MapEdit is \$249 (\$100 dis count if bought with Arias AMP, Express Map, or WorlData); WorlData is \$900,

which includes Arlas AMP: ExpressMap is \$499, which includes Atlas AMP Requires: 320K RAM (ExpressMap and ExpressMap Plus, 448K RAM), two floppy disk drives. IBM Color/Graphics Adapter. IBM Enhanced Graphics Adapter or compatible, high-quality plotter, high-resolution graphics printer, a graphics screen editor, DOS 2.0 or later. New version will support Polaroid Palette, HP 7510, and General Para-

metrics Vulno Sho In Short: Aslas AMP is a powerful, fast. flexible mapping puckage with a special strength in data analysis thanks to its Data-Edit utility. It's complicated to use, but the macro features of ExpressMap make it much friendlier. If you want it all, Allas AMP/Ex-AMP/ExpressMan's new release can deliver what you're looking for. Not copy protected.

Map-Master's clearer, slicker-looking manual (Atlas AMP's manual has been redesigned for September release, but as of this writing, it wasn't available). As Atlas AMP's manual points out, advanced PC mapping is a matter of power versus simplicity. Atlas AMP has the power first and the simplicity second. If you create maps only every few months when making presentations, you might not need all the capabilities of DataEdit and MapEdit or the speed and power of the Atlas AMP system. But Atlas AMP gives you more possibilities, especially with the improvements promised in the new version. If you want detailed data analysis as well as presentation quality, Atlas AMP has the right stuff.

Carol Olsen Day is a frequent contributor to PC Magazine. Her most recent book is The New Immigrants (Franklin Watts, 1985). Currently she also writes for network television.

Micro-to-Mainframe Connections:

SNA REMOTE EMULATION

ommunications between a PC and a mainframe in a remote location require terminal emulation boards and software dedicated to handling that connection. In our last issue, we discussed the differences between biyare and IBM's SNA (Systems Network Architecture) versions of the 3270 terminal and reviewed 7 biyare emulation packages (see "Micro-a-Audinframe Connections: Remote Possibilities," PC Magazine, Volume 5 Number 15). In this article, we will review 15 puckages that emulate SNA terminals.

The difference between the SNA and bisyne protocols is largely a matter of organizational preference. If your mainframe is already strictly tied to SNA, the products reviewed here will provide an able connection between the PC and that system. If your organization is contemplating the purchase of a new IBM mainframe, it will most likely require an SNA terminal, such as the 3270, or a PC that emulates that terminal.

Bisync environments still exist, but, as the proliferation of SNA emulation packages shows, a transition to SNA is proceeding rapidly.—Bill Harts

Communication between the PC on your desk and your organization's remotely located mainframe requires 3270 terminal emulation hardware and software. These 15 remote emulation products offer that capability under SNA, an increasingly popular protocol.

■ MICRO TO MAINFRAME

Remote 3270 Emulation Boards: Summary of Features

Product/Manufacturar	18M PC 3270 18M Corp.	BlueLyttz 3270 Remote Techland Systems Inc.	pcPath SNA-3278 Pathway Design Inc.	ABM SC-327X/ SNA-1 ABM Computer Systems	AST-SNA AST Research Inc.	IDEAcomm 3278/8NA IDEAssociates Inc.	Plus Remate Quadram Com- munications Group
List price	\$665	\$795	\$896	\$895	\$895	\$895	\$895
Terminals/controllers emulated	3274 Model 51C, 3278 Model 2, 3279 Model S2A	3274 Models 51C, 61C; 3276 Model 12; 3278 Models 2, 3; 3279 Models 2A, 2B	451C.	3274 Model 51C, 3278 Model 2, 3279 Model 2	3274 Model 51C, 3278 Model 2, 3279 Model 2A	3274 Model 51C, 3276 Model 12	3274 Model 1C; 3278 Models 2,3,4,5; 3279 Models 2,3,4,5
Applications program interface	Optional	N/A	Standard	N/A	Optional	N/A	Optional
Type of Status Indicators	Characters	Characters and some symbols	Characters or symbols (user selectable)	Characters	Characters	Symbols	Symbols
Diagnostic program or trace routine	•	•	•	•	•	0	0
Maximum speed (bps)	4,800 to 19,200	19,200	9,600	9,600	4,800	9,600	4,800
Automatic dial support available	0	0	0	0	0	0	0
Internal moderns supported	0	•	•	0	0	0	0
NRZI (Nonreturn to zero inverted) data encoding	•	•	0	•	•	•	•
File-transfer software	Optional	Standard	Standard	N/A	Standard	Standard	Standard
Types of Transfer Available Screen dump to file	0	0	•	0	•	•	•
Using TSO EDIT	•	0	•	•	•	0	•
Using CMS EDIT	•	0	•	•	•	0	•
CICS	•	0	•	•	0	0	0
Other	0	0	0	0	0	0	0
User-definable keyboard	•	•	•	•	•	•	•
No. of int'l layouts available	15	9	19	0	13	9	13

IDM DC 2270

IBM PC 3270

No vendor knows better than IBM what a 3270 emulator should look like, and so it came as no surprise that the IBM PC 3270 tested very well on our quality assurance test. But in exchange for getting the real thing—and at \$665, a price well below average for this market—you have to do it IBM's way.

-Indicates Editor's Choice.

IBM doesn't bother taking the steps other vendors take to make their products easy to configure and use. While others hunt for gimmicks to make their products more acceptable, IBM seems to miss some obvious ways to simplify things.

To communicate with a remote ma

frame, you need to use an identification code, called the XID. This is an eight-digit code with two parts: the three-digit IDBLK tells that mainframe what kind of device

■ It came as no surprise that the IBM PC 3270 tested very well on our quality assurance test. you are using or emulating (0.17 for 3274, 0.18 for 3276, or 0.2015 for 3270 PC), and the five-digit IDNUM identifies your specific device (if you for using a real 3270 terminal or cluster controller, the IDNUM is the last five digits of that device's serial number; when you're emulating a 3270 device, you must ask the mainfrane for an IDNUM is the last the same of the configured the PC 3270, dot when the configured the PC 3270, dot when the configured the PC 3270, the possible services and the possible services are sufficiently as the possible services and the possible services are sufficiently as the possible services are sufficiently a

The manual is difficult to use. It looks

Preduct/Manufacturer	SNA Exchange Intelligent Technologies International Corp.	SDLC PC Adapter INS Corp.	DetaTelker PC+ Winterhalter Inc.	3278 PC Remete CXI Inc.	Clee PC2-3276/ 12 SNA Cleo Soltware	AdoptSNA 3270 and Adopt - Medem Metwork Software Assoc.	Medem Exchange Intelligent Technologies International Corp.
List price	\$895	\$995	\$1,095	\$1,190	\$1,595	\$1,780	\$1,995
Terminals/Controllers emulated	3274 Model 51C, 3276 Model 2, 3277 Model 12, 3278 Model 2, 3279 Model 2	3274 Model 51C, 3278	3274 Model 51C, 3276 Model 12, 3278 Model 2	3274 Model 1C; 3278 Models 2, 3, 4, 5; 3279 Models 2, 3, 4, 5	Model 12, 3278	3274 Model 51C; 3276, 3278 Model 2; 3279 Model 2	3274 Model 51C, 3276 Model 2, 3277 Model 12, 3278 Model 2, 3279 Model 2
Applications program interface	Standard	N/A	N/A	Optional	Standard	Optional	Standard
Type of Status Indicators	Characters	Symbols	Symbols	Symbols	Characters	Characters	Characters
Olagnostic program or trace routine	•	•	0	•	0	•	•
Maximum speed (bps)	9,600	19,200	9,600	4,800	9,600	4,800 with internal, 9,600 with external	4,800 with internal, 9,600 with external
Automatic dial support available	0 .	0	0	0	•	•	•
Internal moderns supported	N/A	0	0	0	•	•	0
NRZI (Nonreturn to zero inverted) data encoding	•	•	0	•	•	•	•
File-transfer software	Optional	Standard	Standard	Standard	Standard	N/A	Optional
Types of Transfer Available Screen dump to file	•	0	0	•		0	•
Using TSO EOIT	•	•	•	•	•	0	•
Using CMS EDIT	•	•	•	•	•	0	•
CICS	•	0	0	0	•	0	•
Other	0	0	0	0	IBM host- supported	0	0
User-definable keyboard	•	•	•	•	0	•	•
No. of int'l keyboard layouts available	19	21	0	13	0	0	19

and reads like a standard IBM PC referneemand (that is, so technical that it barely reads like English), but that's not enough when you're trying to install a product. Even with this weakness, the documentation is up to the usual high standards of IBM documentation and does contain hints on where to start and where to go for specific information.

NO TIME-SAVING KEYS Even though several things were not quite problems, they bothered me just the same. In the configuration program, everything is done with menus, but to select from the menus you must enter a letter instead of position-

ing the cursor. IBM seems to have forgotten to use the time-saving cursor-control keys.

Placement of the Enter and New Line keys is also awkward. Many vendors move the Enter key from its traditional 320 position (somewhere near the PC's Ins key) to the standard PC Enter key position. While this may confuse 3270 operators who switch to PCs, it will not confuse PC users who implement 3270 terminal enulation. IBM puts the Enter key on the numeric keypady's 1 or Ent key and changes the PC's Enter key to a New Line key. You can imagine how many times, waited for something to happen, when I'd meant to hit the 3270 Enter key.

meatrix on true \$2.70 Enter Rey.
You can change this arrangement by reconfiguring the keyboard, but IBM doesn't make that easy either. To doesn't make that easy either. To a file with an editor (IBM recommends EDLM), but I do not) and have that file available when you call up the keyboard reconfiguration facility. Why does IBM use this cumbersome system when many better ones are available?

A third aggravation was the lack of an audible alarm to notify you when you make a mistake. Typists who look at the keyboard and not the screen can enter a lot

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MICRO TO MAINFRAME



1BM Com P.O. Box 1328-W Boca Raton, FL 33429-1328 (305) 998-2000 List Price: \$665 Requires: 256K RAM, DOS 2.10 or later. In Short: The lowest-priced remote 3270 terminal emulator that will do windows. File transfer software and Application Program Interface (API) are bundled with the product. Support is obtained from the dealer or distributor, not the vendor. F #21 CNIREADER GEOVE

IBAL PC 3270

of data and later find that it was not sent to the mainframe at all

The IBM PC 3270 is the only product I have seen that has an IBM-compatible Application Program Interface. A look through the overtechnical manual convinced me, however, that this feature is best left to experienced mainframe systems programmers.-Charles Teets

BlueLvnx 3270 Remote Techland Systems' BlueLynx 3270 Re-

mote was presumably named to evoke the image of an exotic cat, thereby surrounding the product with a mysterious allure. There's even a little blue lynx on the front cover of the manual. Somehow, this ploy works. Something about the packaging grabbed my attention. Of course, BlueLvnx is also a pun. On a

more prosaic level, the BlueLynx 3270 Remote is a half-card board that's painted blue and links your PC to a mainframe. Its features include locally supplied color support, a "hot key" for shifting between DOS and the mainframe, and support for

up to five concurrent sessions-three displays and two printers. File transfer is standard as well but limited. You can upload a file from disk; downloading is restricted to screen dumps and redirecting printer output to a file.

On basic tasks, the BlueLvnx 3270 Remote performs as nicely as you could want. It handled the PC Magazine Labs emulation tests with ease, missing out only on the advanced attributes that it doesn't claim to support, such as blinking, reverse video, and underlining.

The keyboard layout is, to be kind, innovative, with the New Line function mapped to the PC's Enter key and the Enter function mapped to the PC's End key. This arrangement is likely to confuse 3270 users who are used to finding the Enter key at the PC's PrtSc position. It is also likely to confuse PC users, who are used to using the Enter key as the Enter key.

Although the basic package comes without a keyboard redefinition module. one is available for the asking, as are nine international layouts. If you order BlueLvnx, I strongly suggest you request the module immediately.

One keyboard asset is BlueLynx's 3270 'hot key," which, unlike on some emulators, works in both directions, letting you shift from a DOS application to the mainframe without having to drop to DOS level

MANY OVERSIGHTS Unfortunately. this promising package has too many oversights to ignore. To start with, the BlueLynx board and software are preset for interrupt level 2, which is probably the most likely to conflict with other, more common options in a PC. Hardware and software are both easy enough to change. and the manual includes a thorough explanation of how to do that, but on the issue of whether to change them, the manual's advice is "Don't worry. Your System Manager will know . . ." That seems optimistic: the manual should give more specific advice or invite users to call Techland for help.

A more serious problem is that the manual doesn't have enough in common with the package I reviewed. Techland sells an optional keyboard for BlueLynx, and the manual is written specifically for the key-

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■ MICRO TO MAINFRAME

board. This arrangement leads to instructions like, "Jumping back and forth . . . between the LU's . . is simply a matter of pressing the [Jump] key to go forward . . .

and the [Alt][Jump] combination to go, backwark." Of course, there is an equivalent key on the PC's keyboard, but the manual doesn't tell you which key it is, or does the Jump command show up on the keyboard layout earl. I finally naked down the proper commands—Cul'd [or forward and Ctrl-k which backward—by systematically trying each Alt and Ctrl key combination until 1 found the ones that worked.

According to Techland Systems, most of these oversights will be fixed in Release 2.6, which had just been amounced at the time of this review. In particular, the manual has been rewritten to take the PC keyboard into account. Changes in the program itself are minor but include a user-definable timeout feature, additional drivers to accept more kinds of printers, and the ability to define the colors the program uses for various fields.

Release 3.0 is under development as



BlueLynx 3270 Remote Techland Systems Inc. 25 Waterside Plaza New York, NY 10010 (212) 684-7788

List Price: \$795 Requires: 128K RAM, one 160K disk drive, DOS 2.1 or later. In Short: Great potential paired with numer-

ous oversights make this product a mixed bag, but Techland promises to correct the errors and add new features in two upcoming

CIRCLE 612 ON READER SERVICE CAR

well and may be available by the time you read this. A Techland representative says that rather than replacing Release 2.6, Release 3.0 will sell alongside it as a top-ofthe-line product, with extra features and functionality.

This news leaves me cautiously optimistic about the BlueLynx. The current Version 2.5 does a competent job of 3270 emulation, but it's not the sort of product that sets standards for others to follow. If Versions 2.6 and 3.0 correct the problems and add enough new features, this will be a far more interesting package.

-M. David Stone

pcPath SNA-3270

Pathway Design's pcPath SNA-3270 communications package uses the same hardware as the bisyne version, and its software has a nearly identical look and feel. The manual sports the same clear writing and professional design layout. The fact that the bisyne version was an easy pick for Editor's Choice (see "Micro-to-Mainframe Connections: Remote Possibilities," PC Magazine, Volume 5 Number

15) bodes well for the pcPath SNA-3270. Of course, SNA is a different world from bisyne, and this package needs to be looked at from a different perspective. In particular, the feature that caught our attention in the bisyne package—the ability to manage multiple concurrent ressions on the mainframe—is rare in bisyne emulators but common in SNA package.

The pcPath SNA-3270 handles multiple essions the same way as the bisyneversion does, and both can manage up to five concurrent sessions. As many as three of these can be print sessions, and each print session can actively print to disk in background while you work on something else. Each session uses the whole screen.

You can see only one session at a time, injurying mone to the next in round-rob-in style with Alt-FlO. While this approach is satisfactory for most applications, it is somewhat limited compared with emulators that show multiple sessions on-screen simultaneously, each in its own window. It's also less than ideal when compared to emulators that let you switch directly to emuly logical unit rather than having to move

through each one in turn. With only five LUs, that's not much of a problem, but call this feature about 80 percent right.

HOT-KEY CAPABILITY The pcPath SNA-3270's "hot key" capability more than makes up for any shortcomings in multiple sessions. Most 3270 SNA emulators have some form of hot-key feature for switching to DOS without ending the mainframe session, but in many cases the only way to get back to the on-line session is to drop to DOS level and type a command like EXIT. The pcPath SNA-3270 uses the two Shift keys as hot keys in both directions. You can, for instance, run a word processor or spreadsheet in DOS and freely switch back and forth between mainframe and DOS application.

Most other features of the pcPath bisync version also fare well in their translation to the SNA version. Hardware installation is almost trivial, and in most cases you only have to plug in the board. Should you need to reset the jumpers, it's easy to find the necessary technical information in the manual. Failing that, you can call Pathway





pcPoth SNA-3270 Pathway Design Inc. I Apple Hill Notice MA 01760 (800) 343-0515 List Price: \$890

Requirements: 256K RAM, one disk drive, DOS 2.0 or later In Short: A well-designed package with easy installation and a clear manual. Two-

way "hot key" implementation is excellent. The only thing missing here is 3770 emula-

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■ MICRO TO MAINFRAME

Design's customer-support hot-line 800number for help.

To install the software, you have to know the settings that the mainframe wants to see, but the installation itself is

straightforward. It includes several nice touches, like letting you define each logical unit separately to use either text or graphics characters in the status line. If you have a color monitor, o.Path will

provide different colors for four kinds of fields, even though the mainframe thinks it's talking to a monochrome terminal. The defaults match the standard 3279 settings—green for unprotected normal intensity, et for unprotected intensified, blue for protected normal intensity, and white for protected intensified. The installation program lets you define the colors yourself from a palette of 16 choices. You

can even define different colors for differ-

ent logical units.
As shipped, PePuth SNA-3270 defines
the PC's Enter key as Enter and uses the
PPD to key for the New Line function.
PPE keys run across the top two lines of the
keyboard, with PP23 and PP24 sign over into the third fine. If you don't like
this arrangement, you can redefine, you can the keyboard as you like using the installation
program. And if you misplace the high you chart, you can use on-line help to get a list
of current key assignments.

Like the bisyne version of this product, the pcPath SNA-3270 handled the emulation tests without a hitch, missing out only on such items as blinking fleids, reverse video, and other advanced attributes that Pathway doesn't claim to support. The testing procedure did not include file transfer, but the pcPath offers three choices as standard—TSO EDIT, CMS EDDT, and CICS. (The package requires the standard IBM software on the mainframe.)

One missing feature worth mentioning is 3770 emulation for batch processing. While this capability is over and above standard 3270 emulation, I've run into it in enough other products to notice its absence here. A 3770 package is available as an option for \$595.

pcPath SNA-3270 is very nearly as impressive in its SNA incarnation as in its bisync version. If you're looking for an SNA emulator, pcPath belongs high on your list. And if you need both SNA and bisync capabilities, you may not need to look any further.—M. David Stone

ABM SC-327X/SNA-1

I took the ABM SC-327X/SNA-1 board out of its protective cover, took one look, and put it right back. The 49 little jumperplug locations gave me pause. Fortunately, only about 20 of them were filled. After



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I regained my composure, I looked a little closer and found that ABM had used jumper plugs to enable or disable all of the RS-232 signals. Other vendors use the more familiar DIP switches, which look like normal chips with wire straps over them. There's no problem with the way ABM designed its board, but it could take several years off a person's life to see all those jumpers.

Actually, the documentation is a little confusing when it comes to setting the jumpers. Good diagnostics ease the situation somewhat: if you set the jumpers incorrectly, the diagnostics will probably lead you to the cause of the problem. More-specific documentation for the diagnostics would solve even more problems: the documentation gives four general areas to check for failures but does not provide any explanation of those failures. The diagnostics have to be run from BASIC (most diagnostics are compiled C or assembly language, but to each his own). which may distress users who are not familiar with that language.

The documentation is printed on 81/2-



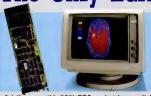
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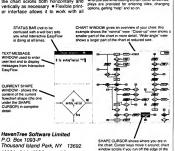
printers, not just dot matrix printers Wide charts can be printed in strips Also works with Hewlett-Packard 7475A (and compatible) plotters . Twenty standard flowcharting shapes included . Com-

mon shapes supplied in three sizes · Extensive manual (125 pages) includes many examples . Context sensitive "help" facility provides immediate assistance at any time . Any number of titles can be placed on a chart · Commentary text blocks can be placed anywhere in the chart . Fast: written in 8088 assembler . Plus many Features: • Text is automatically more features than we can mention

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The semple screen display shown below is typical of what you see while editing a chart. Other screen dis-



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MICRO TO MAINERAME

by 11-inch sheets that have been photocopied and reduced. These clumsy pages are difficult to read and make the configuration process even more frustrating.

No two people can agree on how an IBM 3270 terminal keyboard should be configured. Fortunately, the default keyboard is reconfigurable. ABM's presentation of the reconfiguration capability is attractive: you choose the keys you want to change from an on-screen layout of the keyboard, on which all of the keycaps are numbered

The first SC-327X/SNA-1 board I tried did not work. A cooperative ABM technical person helped me to determine that I had a bad board and sent a replacement that worked properly.

Unlike ABM's bisync board, this package does not include any file-transfer utilities-you must buy them separately. For some users, this omission will render the SC-327X/SNA-1 an expensive alternative to the "dumb" terminal it is replacing.

_Charles Teets

AST-SNA

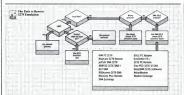
AST-SNA is a mixed bag. Its attractive features include the Application Program Interface (API) and good file-transfer software, but it does not do windows and only allows you to emulate one terminal (additional PCs can communicate with the mainframe through an AST cluster controller product that works with local area networks.)

The documentation comprises three manuals with heavy cardboard covers in a hard-case binder. I would have liked to see tabbed dividers between manuals and slightly different tabbed dividers between chapters within the manuals.

AST's CC-432 board serves for SNA and bisync emulation. Users who need both types of links can use this board for both to reduce costs. The board has its own manual and includes good diagnostic routines

The default interrupt request was set to 2, as is the case with all of AST's 3270 communications products and with some other 3270 terminal emulators. While many vendors claim that this is a reserved interrupt request, too many use it, often creating conflicts within the PC. You can

window



A remote 3270 emulator board can link your PC with a mainframe at a remote site. The products reviewed here work with mainframes running the protocol.

and probably should change the interrupt request at initial installation time to avoid such problems.

The keyboard layout is unusual and difficult to use. The 3270 PF key tasks are assigned to the PC's function keys, and other special keys are located on the top row of the PC's keyboard. The keyboards on most of IRM's 3270 terminals reverse these assignments. You can correct the positions by reconfiguring the keyboard, but I found the keyboard reconfiguration process cumbersome because AST does not give you on-screen examples of the keys. You have to use your memory or rely on the manual.

AST-SNA does not support programmed tabs. While this is not a serious omission, it would bother users who run CICS applications with formatted screens, and it could cause problems for mainframe programmers who are trying to make applications quicker and easier to use. AST Research claims to be working on this problem.

The file-transfer software and documentation, which are the same as those provided with the AST bisvnc package, let you transfer data from the PC to TSO or CMS environments on the mainframe. Although this is a slower method than some of the more-sophisticated PC-to-mainframe applications use, it is easier to install and use and does not require additional mainframe software. Once you have logged on to CMS or TSO and are at the Ready prompt, you initiate a transfer by IDEAcomm 3270/SNA

Like most IDEAssociates terminal emulators, the IDEAcomm 3270/SNA is heavily oriented toward technical users. These users will just love the heavy technical wording of the manual and the WordStar-like mapping of the keyboard, which uses the Ctrl key in conjunction with letters to emulate special 3270 keys. For example, Ctrl-R is for Reset, Ctrl-Z is for Clear, and Ctrl-E is the "hot key" that takes you into local mode.

I had already installed the IDEAcomm 3270/BSC emulation board, so installing this one was a breeze. Both packages use the same board, and you don't have to change switch settings. If you need both bisync and SNA remote access, this feature will come in handy. Software installation and configuration are also the same for both products: I did not have a manual for the SNA package, but I was able to use the bisync manual for some procedures and fake it for the rest. According to IDEAssociates, the manual for the SNA software is similar in style to the manual for the board itself, which means it is well laid out and packaged in a standard IBMsize folder.

Like the IDEAssociates 3270/BSC emulator, the SNA version does not include keyboard templates. To orient yourself, you have to keep the manual open to the page that shows the keyboard layout. Since I'm not a great fan of WordStar-like commands, I took a close look at the keyboard reconfiguration capability. This is a nicely designed feature: you look at a diagram of the keyboard with a number on each key, you choose the numbered key you want to change, and it is indicated onscreen. This intuitive process makes keyboard reconfiguration much smoother than

it can be with other products. The IDEAcomm 3270/SNA's filetransfer utility is somewhat primitive. You can create screen images off-line and use this utility to send those images up to the mainframe. Whatever happened to the slick, sophisticated utilities that would convert file types and automatically transfer data in either direction? When it comes to file transfers, this product does little more than the dumb 3270 terminals it emu-

The first time I examined an

"hot keving" to local mode and then executing the file-transfer program.

The AST-SNA's API allows BASIC. C, or any language that supports assembly language modules to capture and insert screen data. This feature adds flexibility for programmers who want to integrate applications with 3270 remote communications.-Charles Teets



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List Price: 5895
Requires: 128K RAM, one disk drive, DOS
2.0 or later.
In Short: A great choice for technical users
who like WordStar commands, Compatibil-

ny with the bisync version of the product makes the IDE-Acomm 3270 SNA appealing if you need both bisync and SNA mainframe links.

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IDEAs sociates \$270 emulation package, 1. was shocked at the highly technical, difficult nature of the product, 1 still think beginners should stay away, but as a technical person myself, 1've found that the IDEAs sociates approach has begun to grow on me. Once you overcome some of its little quirks, such as the keyboard, you're likely to find these products nice to use.—Charles Teets

3270 PC Remote and Mainlink/Plus Remote

CXI has another one of those products that provide multiple 3270 session windows along with notepads and a DOS window along with notepads and a DOS window. The first one of these I looked a week to be a decided by the provided with the IMP IC 3270 adapter, and just like IBM's CXI's 3270 PC Remote critical me to carting like a 3274 cluster controller. In fact, in many ways this product, even though it's more expensive, offers functions similar to those of the IBM PC 3270. Products that provided 3270 SNASDLC

windows are restricted to 3274 emulation because the Distributed Function Terminal (DFT) mode that allows 3270 windows works only with 3274 cluster controllers. The fact that this product does such a good job of emulating a sophisticated device is a poor excuse for limiting its functionality. CXI should be able to design an expansion board and software that can emulate all

types of IBM 3270 cluster controllers. During our quality assurance test. I noticed that the 3270 PC Remote has an annoving little habit: it displays the first frame of a screen and then waits until it receives all other frames before displaying the remainder of the screen.

Another little problem surfaces when you enter numbers into fields on some of the screens. Once in a while, the emulator is slow in placing the numbers in those fields because it is updating the line and column fields on the status line. It beeped at me even though I am a slow typist-I hate to think of what would happen to a really fast typist.



able with this package. The simpler basic version allows transfers using CLIST under TSO and XEDIT under CMS. These transfers tend to be slower but easier to use than the advanced versions, which use

host-based software to speed up the transfers but also require more mainframe expertise.

All transfers are initiated by switching to the DOS screen and running a program





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■ MICRO TO MAINFRAME

called FTP. Several files provided with the emulator should be uploaded to the mainframe first to make the transfers a little easier and more efficient.

Application Program Interface and keyboard customization software are provided on disks included with the 3270 PC Remote. Also thoughtfully included is a modem cable, which many users will appreciate. It could help them avoid wasting time searching for a cable to connect the emulator to their modems

Evaluating Quadram's Mainlink/Plus Remote evoked a feeling of déjà vu, and for a good reason: CXI makes this product for Asher Technologies, which in turn provides it to Quadram. (Asher and Quadram are owned by the same company.) The emulation board is identical to CXI's 3270 PC Remote, the manuals are very close, and only a few of the files on the four disks have been renamed. The big difference is price: CXI's 3270 PC Remote costs several hundred dollars more than Quadram's Mainlink/Plus Remote

Asher Technologies just put new covers and title pages on the manuals to come up with its own version of the documentation. CXI's program names started with 3274 to denote a cluster controller, but in the Quadram version the program file

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names started with 3278, a curious reference to local terminals. The differently named programs function identically to the CXI programs.—Charles Teets

Modem Exchange and SNA Exchange

Intelligent Technologies International Corp.'s Modern Exchange and SNA Exchange are not quite identical twins. As the names imply, the Modem Exchange includes a modem; the SNA Exchange does not. This is the major difference between them.

The SNA Exchange is a bit longer than a half card, while the Modern Exchange is full size. According to an Intelligent Technologies spokesman, the emulator hardware is the same in both cases. The extra real estate on the full-size board is taken up by the 208 A/B modem.

The sets of programs software provided with the two packages have an identical look and feel; in fact, one set is a slightly rewritten version of the other. Both packages also include software for 3770 RJE emulation.

Installation is reasonably straightforward for either version. The hoards' jumpers and DIP switches are preset to work in most systems, and so you can probably plug the board into a slot and for-

get about it. Unfortunately, if the settings conflict with other options in your system, you might need help correcting them. As with the bisync version of this package (see "Micro-to-Mainframe Connections: Remote Possibilities," PC Magazine, Volume 5 Number 15), the manual hasn't caught up with changes in the boards as yet. The Modern Exchange manual, for example, identifies the IRQ jumper as "the tall blue iumper on the edge of the board." In reality, the jumper is black, it isn't any taller than any other jumper on the board, and it's located above the edge connector, not on the edge itself. Problems like this can be easily cleared

up by a quick call to Intelligent Technologies (which maintains a toll-free technical-support line), but it would be better to avoid them in the first place.

tains at least one important oversight. The Modem Exchange board can use either its on-board modem or an external modem connected to its serial port. What's more. the package is smart enough to look to its serial port, check for an external modem, and then use the external modern if it finds one, or stay with the on-board modern if it doesn't

This important feature gives you the option to use another modern protocol besides the 208 protocol, but it's not mentioned in the installation section of the manual or anywhere else, as far as I could tell. I only found out about it by calling Intelligent Technologies and asking what the DB-25 connector was for. You can't fault a company for adding new features to a product, but it's silly to add features without telling users about them. An Intelligent Technologies spokesman says that the manual is currently being rewritten to correct this and other deficiencies.

SOFTWARE INSTALLATION As in the bisync version of this package, ex-



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In Short: Installation and use are mostly straightforward, but the Intelligent Technologies technical support staff had trouble responding to questions. The Modern Exchange version of this product includes an ORCLE 609 ON READER SERVICE CARD

The Modem Exchange manual con-

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tremely simple software installation makes up for any confusion the hardware settings might cause. The main menu in the configuration program offers choices, each of which lets you change settings in an intuitive way.

Four of the main-menu choices deal with extras rather than essentials: Keyboard Mapping (for redefining the key-

■ The Modem Exchange is smart enough to look to its serial port, check for an external modem, and then use it.

board layout), Color Mapping (for choosing colors for different fields), Printer Parameters (for creating new printer drivers), and Alternate Character Set (for choosing among the 19 international layouts). You can ignore all four until you're more familiar with the system.

To set this package up and running, the only main-ment choices you need worry about are device assignment and communications parameters. The first subment lest you define each logical unit as a display or printer. The second lets you specify the hardware settings for the board and the settings the mainframe needs for physical unit address, cluster type, and terminal ID. If you enter these correctly, you should have no trobule talking to the mainframe.

Unfortunately, a software bug makes entering the values correctly more difficult than it should be. In making my device assignments, I set the software for five CRTs and no printer. The configuration program accepted this without objection, but the emulation software locked up immediately on loading.

It took three calls to technical support, plus a second board shipped overnight, before I found someone who immediately recognized the problem as a known bug and told me to add a printer to the device assignments. It seems that the emulation software chokes on five displays, but the

program doesn't check for this.

Intelligent Technologies plans to fix the bug on the next release, but what this incident reveals about the company's technical support is troublesome. Callers should not have to depend on luck to find someone who actually knows about a known bug.

wno actually knows about a known bug.

Once the problem was solved, the emulator breezed through all of the PC Magazine Labs emulation tests—including those tests that gave trouble to the bisync version of the package.

The modern version of the board comes with auto-dial software as standard. This separate module dials the phone, waits for the moderns to establish contact, then hands control over to the emulation program by means of a batch file. The program by means of a batch file. The program by means of a batch file. The program includes a phone book complete with a search feature, and it will let you auto-dial, auto-answer, dial from the keyboard, or dial manually. This same module is an will work with the UDS external 208 A/B. 208 R/D. and 208 M/B. moderns.

As I've mentioned, the configuration program will let you choose colors for the emulation program to use. The color-mapping option lets you deline colors for mal and high intensity in protected and unprotected fields. A nice feature lets you define numeric fields differently than alphanumeric fields. One can also define colors for the status line.

OTHER FEATURES Many of the features on the SNA Exchange and Modem Exchange are identical to their equivalents on the bisync version of this package. The bot key, for example, shifts into DOS with Alt-D but will not let you shift back to 3270 emulation from within a DOS application. Instead, you have to type EXIT a

the DOS command line.

The keyboard is also the same as in the bisyne package. The default layout assigns the 2370 PF-key asks to the en PC fortion keys—unshifted, shifted, and in Allekey combinations. The New Line function to the Test Key which 2370 PF-key and the Enter key and the Enter fortion to the PTS key, which 2370 seen may like but which will certainly come PC users. However, with the keyboard-configuration program you can easily change any key assignments you

thoughtfully provided a blank keyboard template on the back side of the standard template, so that you can fill in your personalized layout.

All file-transfer capabilities are optional, at 5395 for a screen dump feature, \$500 each for TSO edit or CMS XEDIT, and \$2,000 for CICS. (These prices include tapes for the mainframe side of communications.)

The SNA Exchange half-card is the SNA same board that's in the Blsync Exchange package. In fact, you can use the same hardware for bisync and SNA, simply by getting additional software—at \$595 for the SNA software or \$650 for the bisync and SNA, simply by you if your mainframe is using bisync now but may switch to SNA in the near future.—ML David Stone

SDLC PC Adapter
The simplicity and flexibility of INS's
SDLC PC Adapter make it an outstanding
product, despite several problems.

 The design of the SDLC PC Adapter board is surprising—it has no switches or jumpers to complicate the installation process.

The design of the SDLC PC Adapter board surprised me—it has no switches or outpurpers to complicate the installation process. Setting up the software was not much harder: you copy the emulator program along with the configuration program for the keyboard you want, and the subdirectory on your hard disk is set up and ready to use.

The configuration program comes in 17 different flavors to accommodate 21 international keyboard layouts. These configuration programs use 9 languages for its screens and are closely tied to the 18 differ-

ent keyboard templates. This may not be the most thrilling aspect of a 3270 terminal emulation package, but it is helpful and somewhat unique: although many vendors include international keyboard layouts, few of them provide international configuration programs and international key-

board templates.

While not difficult to use, this configuration program did have one confusing aspect. The IDBLK and IDNUM that make up the XID on the mainframe add up to eight digits. The INS configuration program asked for ten digits; to fill up the space I experimented with putting trailing zeros in the field. I was wrong-they should have been leading zeros-but the INS support person was very helpful. He must have run into this problem several times before because he knew the answer immediately. He assured me that this error will be fixed in a future release.

WRONG DEFAULT The other problem I ran into could be more serious for some



SDLC PC Adapte INS Corp.

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- Mobile, AL 36691-9990 (205) 633-4187
- List Price: \$995: file-transfer software for TSO or CMS, \$25 each
- Requires: 128K RAM, one disk drive, DOS 2.0 or later In Short: An easy-to-use, easy-to-install em-
- ulator with inexpensive file-transfer software. Configuration programs are available in nine languages and 18 different keyboard templates. Its several problems can be overcome and shouldn't cause much trouble. CIRCLE 620 ON READER SERVICE CARD

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ou torn on your AT" com suddenly it starts to happen. Your computer starts gasping for information because your Al battery is dying. The simplest data, like the lime and data, becomes a struggle. All vital signs start fading from the screen. Without action, the victim will soon lapse into

hat would you do?

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users. There are two parameters called pacing parameters in the Physical Unit (PU) description of the Network Control Program (NCP), which runs on your 3705 or 3725 front-end processor. The default value for these pacing parameters is 1, but the SDLC PC Adapter supports only a value of 0. Again, this problem will be resolved in a future release. I was lucky to have access to an experienced telecommunications systems programmer who changed the pacing values for me on the fly, but you can accomplish this only if you are accessing the mainframe through a valid switched (dial-up) configuration, as we were. If you're using leased lines, you're

out of luck.

I found a disturbing omission on the SDLC PC Adapter's keyboard. The PC's CapsLock key is used as the Reset key—a very important 3270 key that lets you unlock your keyboard if you enter an incorrect keystroke—but the CapsLock func

tion is not assigned to any key. You can reconfigure the keyboard to retrieve the missing Caps Lock, but that can be a difficult and cumbersome process. You must constantly look up reference numbers for the keys when trying to change the functions of those keys.

I was also surprised to see that the board had a female connector for the modern cable. While this is standard for most data communications products, it is not standard for IBM PCs and compatibles. Fortu-

nately, the vendor will supply a cible.

To transfer files with the SDLC PC
Adapter, you switch to an alternative
screen and use INS's versions of TSO and
VMCMS file-transfer software. As 25
for each version of mainframe transfer
software, this is one of the best deals going. While adding little burden to your
budget, this vendor-supplied software
transfers data much faster than TSO EDIT
or CMS XEDIT—Charles Teets

DataTalker PC+

The DataTalker PC+ from Winterhalter comes with CalcTran, a file-conversion program for use with its file-transfer soft-ware. CalcTran, which can convert files into or out of 1-2-3, Symphony, VisiCale, dBASE, Multiplan, or BASIC formats, can be very useful even when you are not using 370 eminal emulation.

The Data Talker PC+ board is not difficult to install, but I was a little disurbed in find that I could not change the interrupt request. This product uses IRQ, which may conflict with the COM2-port on your PC. Software installation is a breeze: after you answer a few questions about the optional software you plan to use, the rest of the process is automated.

You can select screen colors during the configuration process, and I would recommend that you change them to the standard 3270 colors of cyan, white, green, and red. The default color scheme uses brown.

The Canon Bubble-Jet Printer is very compatible with all these units.



which looked like mud on my screen for the unprotected normal-intensity fields, which are usually green.

Two serious omissions emerged during testing. The DataTalker PC+ package lacks a keyboard template, and so you'll have to use the description of the default keyboard in the manual. This is a cumbersome way to work with a 3270 terminal emulation product.

The lack of an audible alarm to alert you when you make a mistake will disturb you if, like me, you are a below-average typist and need to watch the keyboard when you type. Errors in 3270 data entry lock the keyboard, and you won't be aware that your data is not being accepted.

You can attach an additional PC to act as a 3278 or 3279 display station. The second PC is connected through a separate cable from the DataTalker PC+ card, and it requires slightly different software.

File transfers can be performed by hit-

The DataTalker PC+ is not difficult to install. but I could not change the interrupt request.

ting the Command key-a sort of "hot key." These transfers, which use EDIT under TSO and XEDIT under CMS, are a little slow but easy to implement and usc.-Charles Teets

Cleo PC2-3276/12 SNA Cleo Software's SNA remote emulation board, the Cleo PC2-3276/12 SNA, comes with its own 2,400-bit-per-second modem called SyncModem. Although I could not use the SyncModern in this evaluation (I needed 4,800-bps communications), an auto-dial modem like this one is a welcome addition to such a product.

The SyncModem has one quirk that could cause problems for some users: the RS-232 connector on the back edge of the cord is a female connector like the ones found on most modems and non-PC terminal devices. The PC has a male connector. and most users have cables that will not work with this card. Fortunately, I had a cable with male and female connectors on each end. Although the SyncModem has telephone jacks and an RS-232 port, an additional PC can only be connected through another COM port on your PC.

The Cleo PC2-3276/12 SNA board is interchangeable with the Frontier Technologies ADCOM-2 board, which Cleo sent us with its bisync package. Either board will work with either product.

During the installation process, the pro-



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DutaTalker PC+ Winterhaler Inc. 3796 Pasa Dr. Ann Arbex, 3ll 48104 List Programs of the Post Post Post Post List Price; \$1,095 List List Price; \$1,095 List List Price; \$1,095 List Pric

gram asked me for the type of controller (3274 or 3276) rather than the three-digit ID block. While this approach may be easier for inexperienced users to understand, it could create confusion for users who have been given very specific instructions by their company's mainframe communications expert.

Cleo's keyboard configuration is not unusual or hard to use, which is fortunate for two reasons: the keyboard template is small and difficult to read, and there is no way to reconfigure the keyboard. The latter is a crucial omission because keyboard reconfiguration is an important aspect of a 3270 terminal emulation package because no configuration pleases veryone pleases veryone.

Cleo provides simple file-transfer capabilities; advanced file-transfer software is also available but priced separately. The simple file transfers, which work with TSO EDIT and CMS XEDIT, are slower than the more advanced transfers. Those advanced file transfers take advantage of host-based software to speed up the rate of transfer.

A limited Application Program Interface (API) allows BASIC programs or as-

sembly language routines to exchange data with screens. BASIC routines and calls are provided to help you deal with screen and keyboard data. This arrangement is better than having no API but not as good as APIs that can use C because compiled C programs tend to run faster than BASIC programs.—Charles Teets

AdaptSNA 3270 and AdaptModem

Adaptivioueth Depending on your point of view, Network Software Associates' AdaptSNA 3270 for the AdaptModern is either more than a fully integrated SNA communications package or somewhat less.

NSA treats the AdoptSNA 3270 software essentially as a standalone SNA synchronous communications program—in the same sense that Crosstalk XVI is a standalone asynchronous communications program. The software and the AdaptModem are sold separately—ast \$585 for the software and \$1,195 for the board. The manual is organized as a soft-



The SNA market is much larger than the bisync one, and many of the products are good. INS Corp.'s SDLC PC Adapter is an excellent choice, primarily for its easily installed board and its extremely flexible and versatile keyboard configuration programs.

Authorities Design, which carned our praids in the shyne rounding or praids in the shyne rounding ("Micro-to-Mainframe connections: Remote Postshillies," Vol. wame 5 Number 15), again deserves mention. The pet Park SNA-3270, like in bisyne sibling, is exceptionally well organized and well documented. However, the concurrence and the substitute of the s





Cleo PC2-3276/12 SNA

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ware manual with a generic modem in mind. Details on the AdaptModem hardware show up in an appendix.

If you know what you're doing and you want to mix one vendor's software with another's hardware, you will probably consider mis approach a plus. If you're new to PCs or synchronous communications, however, you might prefer a package that gives you more-tightly integrated instructions for getting started. Less-experienced users are also likely

to be stymied by the manual, which carries

terseness to new extremes. All the technical information you need is there, but you won't find much in the way of explanations. The instructions for a floppy system tell you to copy the distribution disks to two formatted disks and then reboot the system. Of course, this will not work unless you have formatted one of the disks with the 58 (or system) parameter, but the manual assumes you know that already. The AduntSNA 3270 software is de-

signed for the IBM SDLC Communica-

tions Adapter, which makes it compatible with any equivalent board. According to NSA, the program works with at least 13 boards, including 3 sold by NSA.

The AdaptModern hardware, a combination emulator bourd and modern made by UDS, is the same board used by Inteligent Technologies International in its Modern Exchange package (see review). Its jumpers and DIP switches are preset to work in most systems. If you need to change the settings, the information is easy enough to find—as long as you know how to interpret the chars.

The configuration program, like the manual, is easy to follow if you know what you're doing, but it doesn't qualify as intuitive. Many users are trained to hit the Esc key when they want to back up one screen. In this program, doing that will dump you to DOS without saving your changes and without asking you first. An inexperienced user may be overwhelmed by the technical look of some of the screens. The ASCII-



AdaptS/NA 3270 AdaptModem Network Software Associates Inc. 22982 Mill Creek

22982 Mill Creek Laguna Hills, CA 92653 (714) 768-4013 List Price: \$1,195 for modem; \$585 for soft-

ware (sold separately) Requires: 256K RAM, one floppy disk drive. DOS 2,0 or later.

In Short: A good choice if you want to mix software from one vendor with the board from another. Lack of file-transfer support severely limits AdaptSNA's software abili-

severely limits AdaptSNA's software abilities, but a soon-to-be-released new version will add file-transfer capabilities.

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simply puts a chart of hex codes on-screen and assumes you are familiar with both the ASCII and EBCDIC codes.

Other choices in the configuration program include a user-definable EBCDIC-

to-ASCII translation table, a printer configuration menu (more hex codes), a keyboard configuration menu, a logical unit assignment menu, and the main menu, which includes the settings the mainframe needs to see—cluster address, station ID, and device type.

ON THE LEAN SIDE For the most part, the package works as expected, but most features are on the lean side. For example, the board can auto-dial, and the software includes an auto-dial, and the software no telephone book in the software. You cher have to type the phone number at the keyboard or create a batch file with the number in it.

Similarly, the not-quite-hot key lets you leave the emulator without breaking the phone connection, but to get back to the mainframe session you have to reload the program. This approach has the advantage of freeing up more memory for DOS applications, but you lose the convenience of bouncing back and forth at will. (According to NSA, the next release of the software will retain this option and add a true "bot key.")

Other features include support for multiple sessions with a maximum of two displays and two printers. The program comes with both a predefined typewriter keyboard layout and a data entry keyboard layout.

PC Magazine Labs tests turned up one problem in the emulation. Version 652 of the AdaptiSNA 3270 software does not respect numeric fields. According to NSA, this bug was inadvertently introduced in a recent revision of the software, and it will be corrected the next time around.

Finally, note that the current version of AdapaNA 3270 has no rile-transfer capability. According to NSA, however, the next release will include support for transfer with the standard IBM file transfer program running under TSO and CICS. Since fire with the standard IBM file transfer program running under TSO and CICS. Since life transfer is one of the main reasons for using a PC instead of a dumb terminal, you might want to bypass this package for now but plan to take another look at it when the new version corners out this fall.

new version comes out this fall.

—M. David Stone

Bill Harts is president of Open Communications, a Melville, New York-based communications consulting firm. Charles Teets is president of TCT Consulting, a New Jersey-based PC communications consulting firm. M. David Stone is a frequent contributor to PC Magazine.

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PRODUCTIVITY

C LAB NOTES: FILE SECURITY WINN L. ROSCH

KEEPING YOUR FILES PRIVATE

Passwords, hidden files, illegal filenames, and encryption schemes give your hard disk varying degrees of protection from the curious or crooked.

personal computer with a hard disk, like a filing cabinet to which Lit is so often compared, holds some of your most valuable records. The filing cabinet has at least one advantage over the high-tech PC, however: it can be locked. The PC on your desk is almost an open invitation to prying eyes. While you could, of course, lock your

machine at night, physical security measures may entail an unacceptable degree of inconvenience (one exception: removable mass storage devices, such as the Remoulli Box). The state-of-the-art alternative is electronic security: locking your files digitally so that unauthorized peepers cannot gain a glimpse of what is meant for your eyes only. Similarly, if you have programs that give you a valuable competitive edge, you can lock them in ways that make them impossible to copy.

This article will explore some of the rudimentary means you can use to protect the confidentiality of your PC and its data. While no electronic measures are theoretically fail-safe, even at this basic level, breaking in will require effort and a knowledge of the PC system. The security measures discussed here will thus at least discourage prving even if they cannot absolutely guarantee the security of your machine or files.

PREVENTING ACCESS WITH PASS-WORDS Most personal computer security systems are based on the concept of access control: only one or a few designated individuals should know how to gain access to the system and its data. For access control to work, of course, the system must first have the ability to recognize authorized users and be able to distinguish them from interlopers.

Passwords are probably the most common means of identification. The computer requests an identifying password from the operator and compares his or her response to the correct password it has in its memory. If the keyed-in password and the one in memory match, access is allowed to the system.

A password scheme is easy to implement by writing a short BASIC program. All it really requires is an INPUT statement and a string comparison. The example below illustrates how easily such a

PRODUCTIVITY INDEX

PC LAB NOTES How to protect vulnerable and sensitive files PROGRAMMING/UTILITIES

Clean up your hard disk painlessly with XDEL COM. SPREADSHEET CLINIC Skip cells when you copy, and change numbers to words.

POWER USER dBASE printer codes, SideKick patches, and WordPerfect macros USER-TO-USER

Better batch branching, backup tricks, and DOS command piping

PC TUTOR ECHOing blank lines and programming port registers scheme can be implemented: LE PRESMORDE-"SMORDFISH" 20 INPUT "What is the password" | TESTS
30 IF TESTS-PRESSWORDS THEN PRINT "CORRECT:" FIRE BEED-DRINT *OCCESS DENTED!*

The INPUT statement in this simple program puts the message "What is the password?" on the screen and waits for a typed response. It then compares the typed string to the programmed password (in this case, "SWORDFISH"). If the typed string does not match the password, the computer beeps, displays "ACCESS DE-NIED," and ends the program.

If the input string and the password match, then the program prints "COR-RECT!" on the screen and, in this case, stops. However, when such a routine is used in an actual system, the next step would be to execute whatever program was supposed to execute.

Such a simple scheme can easily be improved upon. Note, for example, that the keystrokes typed in response to an INPUT statement (as in the above routine) are always echoed to the screen. Thus, anyone peeking over your shoulder could glimpse the password and return later to do his dirty work. By substituting a series of INKEYS statements, however, the on-screen echoing is eliminated, as below:

```
30 PRINT "What is the password? ";
40
        RS-INKEYS
        1F 04="" THEN BOTO 49
        IF RE-CHRE(13) THEN GOTD 98
6.0
        TEST4=TEST4+R6
```

28 PRESMORDS+*SWORDFISH*

100 IF TESTS-PRESHORDS THEN PRINT "CORRECT!" ELSE BEEP: PRINT "ACCESS DENIED "

■ PC LAB NOTES

In this example, the response is typed into a loop of INKEY\$ statements. IN-KEY\$ causes the keyboard to be continu-

ously read but not printed on the screen.
After each keystrole is read, it is compared to a null string (meaning no key has been struck), in which case it is ignored.
Then it is compared to a carriage return (ASCII 13), which will be typed to end the password. When this is encountered, the loop is ended and the program continues to its next step. All other keystrokes are appended to the string TESTS.

After Return is pressed, the completed input string (TEST\$) is compared to the programmed password (PASSWORD\$), as in the first example.

These few lines of password protection can be added to the beginning of almost any BASIC program to guard against unauthorized usage. As a further precaution, you can include a program with password protection in the AUTOEXEC.BAT file of your system as a way to prevent unauthorized use of your PC.

LMITING BREAKS The most obvious weakness of these password schemes is that the Cril-Break sequence can interrup programs and batch file execution on the PC. For instance, the AUTOEXEC BAT existence in the protection program can easily be halted by pressing that key combination. The protection program itself can be broken into simply by pressing Cril Break. Thus, to make any password Break. Thus, to make any password ing the operation of the Cril-Break key combination is necessary.

One of the quickest ways to prevent Ctrl-Break break-in from the DOS prompt is to change the interrupt that the system executes when it detects a Ctrl-Break. That interrupt is 1B (hex). NOBREAK.COM (see the short pro-

gram shown in Figure 1) can be created with DEBUG. It is a 14-byte command that simply redirects the normal 1B interrupt to an ordinary "interrupt return" instruction. The Crul-Break sequence thus ends as soon as it begins, without breaking into the execution of batch files for the directory listings, or anything that Ctrl-Break would ordinarily stop).

After you create the program, make it the first listing in the AUTOEXEC.BAT C:debug nobreak.com
-a
xx.selse MCV Ax.25lB
XXXXx:else MCV Ax.418D
XXXX:else 187 21
XXXX:else MCV Dx.else

10000

ie

Figure 1: Typing in this quick assembly language program using DEBUG will make a program called NOBREAK COM, which defeats the function of pressing Ctrl-Break at the DOS prompt. The XXXX value will vary for different machines.

file in your system.

Unfortunately, this strategy won't work
with the BASIC PASSWORD programs
shown earlier, for BASIC resets the CtrlBreak interrupt when it starts running.
However, you can reroute the Ctrl-Break
interrupt during BASIC, too, using the appropriate PEEKs and POKEs.

Figure 2 shows a program that recouses for CvI-Break interrupt. In Figure 2, in-deed, the interrupt is not merely climinate cit it is redirected so that it duplicates the function of interrupt 19th (decimal 100), Interrupt 19th resist the system by simulating the simultaneous pressing of the CvII-Al-Del keys, (Because this tactic flagrantly sidesteps the design of the PC system, some computers may lock up when That result, or corone, correct your purpose just as when I have the course, exerce your purpose just as when I have the course, exerce your purpose just as when I have the course, exerce your purpose just as when I have the course, exerce your purpose just as when I have the course in the course of t

HABDCORE HARDWARE SECURITY MEASURES Still a further problem with password access control systems is that they can usually be defeated by an interloper who inserts a boot disk in drive A.. Since the PC system tries to boot from a floppy disk before trying out the hard disk, even if you've protected your hard disk from prying eves, an erstwhile spy need

16 DEF SEG-8 28 FOR X-8 TO 3 38 Y=PEEK(188+X) 48 POKE (188+X),Y 58 NEXY X

Figure 2: This BASIC program switches the Ctrl-Break interrupt to act as a warm reboot and so prevents Ctrl-Break from interrupting BASIC programs. only boot it up using drive A: and a DOS

disk. Eliminating such subterfuge requires a hardware security scheme of some kind. The most effective commercial security systems and extra ROM memory to your systems so that a password is required for access even before the booting processing begins. Making a security ROM is difficult and requires special equipment, however. [Readers interested in this topic should see Charles Persold 3 siticustion in PC Tutor,

PC Magazine, Volume 5 Number 1—Ed.] A simpler way to prevent break-in bootups from floppy disk is to disable drive A:. In systems with only one floppy disk drive, this procedure is best accomplished by turning drive A: (from which the system can boot) into drive B: (from which it can-

The secret to switching drive assignments is the wide ribbon cable that enters is the wide ribbon cable that enters is the ribbon cable that cancel in the IBM scheme of things card. In the IBM scheme of things one for the controller card, and one for the controller card, and one for the controller card, and one for two floopy disk cables have three connectors for each of the two floopy disk drives that can be mounted in the system unit. Tho floopy connectors differ visually from one another because IBM gives the wide but on cable a twist before it reaches the drive A connector.

You should remove this connector at the drive A: and and replace it with the connector originally intended for a second floopy unit (drive B). On a system be B). On a system the Bloopy to the connector originally set up for a single floopy drive, you must now also reset the DIP which sets the DIP which sets the DIP which sets to indicate that two floopy disks are installed—even though you've left the disk are installed—even though you've left the disk on we recognize the existing PC floopy drive as B. (With the AT., you'll have to go through its setting procedure.)

ENCRYTING FILES A floppy left unguarded for even a short while may be compromised; stealing information is as fast as DOS's COPY command. Data security can also be breached if you exchange disks with a coworker or if you transmit files through a telecommunications system. Electronic messages can be intercepted as easily as tapping a normal telephone line.

While no completely fail-safe method

Stealing information is as fast as DOS's COPY command. A good way to minimize the danger is to encrypt (encode) your files.

of preventing such security leaks is likely to be practical, a good way to minimize the danger from a file? falling into the wrong hands is to encrycle (enced) it. Albands is to the secure—some government agencies specialize in breaking the most-compile codes, using the most-powerful computers—at the practical level you can make deciphering your ensages so difficult that all but the most determined eavesdroppers will be deterred.

The most basic coding scheme is simple substitution, representing one character of the original document or digital byte of a program with a different character or byte. As you may know from having solved the cryptograms in mexpapers, however, such simple substitution codes are also the essient to break. The frequency of occurrence of the various characters (which provides valuable insight into breaking the code) does not change with the substitutions.

Figure 3 improves on this elementary substitution code by mathematically com-

```
18 INOT That is the source file | SOURCE |
18 INOT THAT IS THE SOURCE |
18 IN THAT IS THE SOURCE |
18 IN THE SOURCE
```

Figure 4: This program is the complement to the one in Figure 3 and will decrypt a file when the proper code key is given.

bining a code key with the ASCII character of each byte of an original file. Thus, in the resulting encrypted file, character frequencies are disrupted, and the code is much more difficult to break.

The program shown in Figure 3 is conceptually simple. First, it solicits the names of a source file, a destination file, and a code key. Then it merely reads one character at a time from the source file, adds the value of the next character value (adjusting it to keep it width an normal sizely in value), and then writes the result into the destination file. (Recause it works) conclaration of the contract of the contraction o

The code key can be a character, a word, or an entire sentence—anything that a BASIC input statement will accept. You can increase the possibilities for code keys by using a LINE INPUT statement instead.

rather slowly.)

Figure 4 shows the complementary decoding program. The only major difference between it and the previous program

is that it subtracts the value of the code key character from the appropriate byte in the source file.

The programs given in Figures 3 and 4 can form a basic encryption system. Files can be coded and recovered intact only by those knowing the appropriate code key fleeders seeking an even higher degree of encryption-based file security should consider Steven Hother's LOCK.COM, in our Programming/Utilities column, PC Maszainc, Volume 4 Number 18—Ed.]

PROTECTING PROGRAMS WITH COPY PROTECTION Since keeping your special programs your own is usually a matter of preventing interlopers from copying them from your hard disk files, one expedient would be to disembowel DOS and defeat its COPY command. A better solution, however, is to work on the periphery of DOS, taking advantage of some of its idiosyncrasies. DOS is very particular about filenames, for example, With but a few exceptions, DOS will not allow you to use nontext characters in filenames. However, you can use many higher-level languages-BASIC or even assembly language-to create filenames that DOS will refuse to deal with individually. Even DEBUG won't let you directly edit a

Using BASIC, however, you can give a file you wish to protect an illegal filename. Suppose you don't want anyone to see your file INCOME.TAX. If you load BASIC you can then give the direct command:

file with an illegal name.

NAME INCOME. TAX IN OME. TAX Since the filename contains an illegal character (a space), DOS won't let it be copied

168 CLOSE
Figure 3: This short BASIC program will encrypt any file using a code key of your choice. Because

it works one character at a time, however, it is somewhat slow.



FACT FILE

SOFTWARE

Coffee Break MPPI Ltd. 2200 Lehigh Rd. Glenview, IL 60025

(312) 998-8401 List Price: \$24.95 Requires: 8K RAM, DOS 1.0 or lat-

In Short: A keyboard lock that lets the machine execute a program while the screen is blank and the keyboard is frozen. Not copy protected. CRICLE 669 ON READER SERVICE CARD

Corporate Courier Obsidian Computer Systems 580 Grand Ave., Suite N Oakland, CA 94610 (415) 839-0101 List Price: \$125

Requires: 256K RAM, DOS 1.1 or In Short: For corporate networks. Uses the public key model to encrypt

text or binary files. Allows telecommunications transmission. Copy protected

CIRCLE 666 ON READER SERVICE CARD Data Encoder IBM 1133 Westchester Ave

White Plains NY 10604 (914) 765-1900 List Price: \$109 Requires: 192K RAM, DOS 2.0 or

In Short: Menu-driven utility that uses the DES algorithm to encode/de-

code text or binary files. Not copy protected. CIPICLE 887 ON READER SERVICE CARD DATALOK Vault Corp. 2649 Townsgate Rd., #500 Westlake Village, CA 91361 (800) 445-0103 (805) 499, 5978

List Price: \$169 Requires: 128K RAM, hard disk

In Short: Protects data files from unauthorized access and duplication using DES- or Vault-based proprietary encryption. Encrypts files based upon the presence of a physical fingerprint that is placed on included disks. Network compatible; decrypts files; can transfer secured data by modem; optional password access. Copy pro-

CIRCLE 666 ON READER SERVICE CARD Data Padlock

Glenco Engineering 3920 Ridge Ave. Arlington Heights, IL 60004 (312) 302-2402 List Price: \$65 Requires: 64K RAM, DOS 2.0 or

In Short: Encodes text or binary files

with a software implementation of the DES algorithm. Not copy pro-CROLE MA ON READERS ERMOR CARD

DataSafe Trigram Systems 3 Bayard Rd., #66 Pittsburgh, PA 15213 (412) 682-2192 List Price: \$139

Requires: 64K RAM, DOS 2.0 or In Short: DataSafe encrypts text or binary files using the DES algorithm.

Not copy protected.

Toronto, Ontario Canada M5M 2E5 (416) 485-5403 List Price: \$350 CIRCLE 664 ON PEADER SERVICE CARD Regulres: 96K RAM, DOS 2.0 or In Short: Integrated security soft-

Security, Version 1.04

224 Old Orchard Grove

H-F Computing Services Inc.

ware. Utilizes a proprietary algorithm to encrypt text or binary files. Not copy protected CIRCLE 661 ON READER SERVICE CARD

Failsafe Encryption Jackson Software 1729 Mayflower Dr. Carrollton, TX 75007 (214) 492-1927

List Price: \$59.95 Requires: 64K RAM; IBM PC, XT.AT. or most compatibles; DOS 2 O or later In Short: An encryption software package with added safety factors to prevent unwanted disk destruction.

Prevents accidental double encryption and decryption. Will not encrypt EXE, .BAC, or .COM files unless specifically instructed. Not copy pro-

CIRCLE 663 ON READER SERVICE CARD FILEION Vault Corp. 2649 Townsgate Rd., #500

Westlake Village, CA 91361 (800) 445-0193 (805) 499-5978 List Price: For package of two. \$18.50 Requires: 128K RAM. In Short: Protects data files from un-

authorized access and duplication using DES or Vault proprietary encryption. Encrypts files based upon the presence of a physical fingerprint that is placed on the disk itself. Files to be encrypted must be placed on finger-

COPY protected.

ORCLE 650 ON READER SERVICE CARD printed disks. Copy protected. Mailsafe HFTools for File/Directory

RSA Data Security Inc. 10 Twin Dolphin Dr. Redwood City, CA 94065 (415) 595-8782 List Price: \$250 Requires: 192K RAM, DOS 2.0 or later

In-Use

Aurotech Inc.

Denver, CO 80224

List Price: \$29.95

(303) 388-1612

MagLock

169 Burnside Tonawanda, NY 14150

(716) 603-0584

List Price: \$89

or expansion chassi

925 So. Niagara St., #100

Requires: 64K RAM, DOS 1.0 or

In Short: A software keyboard lock

that disables the keyboard while al-

lowing applications to execute. Pre-

vents unauthorized machine access

Requires: 64k RAM, hard disk drive

In Short: Secures any type of files,

directories, or a 10-Mbyte drive in

seconds without hardware or operat-

ing system modifications; encrypts

data at the file level using DFS or

proprietary source module; creates

cess: includes utilities to clean up de-

leted files to ensure absolute deletion;

audits files with a command; allows

unlimited password selection. Not

read/write access or read-only ac-

during boot. Not copy protected. GROLE 660 ON READER SERVICE CARD

Flinder Software Laboratori

In Short: An integrated package that provides nonforgeable signatures and telecommunications encrypting as well as local encryption (either DES or a proprietary algorithm). Not copy protected ORCLE 659 ON READER SERVICE CARD

PC MAGAZINE . **SEPTEMBER 30, 1986** PC-DESK Software Studios Inc. 8516 Sugarbush Ct. #104 Annandale, VA 22003

(703) 978-2339 List Price: \$125 quires: Memory depends on functions loaded. In Short: Integratted software package with proprietary encryption algorithm that provides on-screen en-

cryption and telecommunications xilities. Not copy protected. CLE 667 ON READER Personal Courier Obsidian Computer Systems

580 Grand Ave., Suite N Onkland CA 94610 (415) 930-0101 List Price: \$75 Requires: 256K RAM, DOS 1.1 or

In Short: For networked PCs. Uses the public key model to encrypt text OF binary files. Not copy protected. ORCLE 666 ON READER SERVICE CARD

PhasorCode 1000 International Phasor Telecom Ltd. 134 Abbott St. Vancouver, British Columbia

Canada V6B 2K6 (604) 732-1422 List Price: \$99 Requires: 256K RAM, DOS 2.0 or

In Short: Uses public key model to encrypt text or binary files. Translates ASCII files to and from binary files. Not copy protected. CIFICLE 888 ON FEADER SERVICE CARD

United Software Security Inc. 8133 Leesburg Pike, #800 Vienna, VA 22180

(800) 892,0007 List Price: \$195 Regulres: 64K RAM, DOS 2.0 or

In Short: Provides menu-driven memory-resident encryption, utiliz ing either the DES standard algorithm or a faster, proprietary algorithm. Not copy protected.

The Private Line Everett Enterp P.O. Box 193 Bath, NC 27808

miscied

(919) 923-5621 List Price: \$49.95 Requires: DOS 2.0 or later. In Short: Encrypts text, data, as programs using DES; converts encrypted data to ASCII; displays, prints, and purges files. Not copy

CIPCLE MIX ON READER SERVICE CARD PROTEC, Version 3.1 SOPHCO, Inc. P.O. Box 7430 Boulder, CO 80306-7430 (303) 444-1542

List Price: \$195 Requires: 128K RAM, hard disk* drive, DOS 2.0 or later. In Short: Integrated security package. Encrypts text or binary files using either DES or a faster, proprietary algorithm, the PhFA II. Not

copy protected. CIRCLE 652 ON READER SERVICE CARD SecretDisk Lattice Inc. P.O. Box 3072 Glen Filten II 60138 (312) 858-7950

List Price: \$119.95 quires: 128K RAM. In Short: Protects data from unauthorized access by use of a password. Creates virtual disk drives that are automatically and completely encrypted. Not copy protected. CRCLE 651 ON READER SERVICE CARD

Balis Computing Inc. 1121 S.W. 19th St. Boca Raton, FL 33432 (305) 391-4610 List Price: \$52 Requires: 128K RAM, DOS 1.1 or

In Short: Encrypts ASCII or word processing files using one of ten thou sand proprietary codes. Permits dual encryption and modern transmission Not copy protected.

SECURE! PS Winterhalter Inc

P.O. Box 2180, Dept. P.S. Ann Arbor, MI 48104 (313) 662,2003 List Price: \$69.95; with audit trail (mid-August release), \$99.95 Requires: 64K RAM, DOS 2.0 or

In Short: Automatically encryp data, files, directories, or entire disks; has keyboard lock and screen-clearing features: allows up to 110 users on a PC or disk drive; soon-to-be-released audit trail generates reports on computer usage. Not copy protected.

Super Encrypter I & II Obsidian Computer Syst 580 Grand Ave., Suite N Oakland, CA 94610 (415) 839-0101 List Price: Super Encrypter II. \$99.95; Super Encrypter I \$49.95. Requires: 256K RAM, DOS 1.1 or

In Short: Utilizes a proprietary en cryption algorithm to encrypt text or binary files; allows encrypted data to be sent over modems. Super Encrypter II copy protected. Super Encrypter I not copy protected. CIRCLE \$49 ON READER SERVICE CARD

SuperKey Borland Inernational Inc. 4113 Scotts Valley Dr. Scotts Valley, CA 95066 (409) 439,9400 List Price: \$69.95

Requires: 128K RAM, DOS 2.0 or In Short: Integrated keyboard macro memory-resident program that encrypts using either DES or Borland's proprietary algorithm. Not copy protected. CIPCLE 647 ON READER SERVICE CARD

U-PSYPHER Prime Factors Inc. 6529 Telegraph Avc. Oakland, CA 94609 (415) 654-5090 (415) 654-8040

List Price: \$295 Requires: 64K RAM. In Short: Encryption and decryptic package using a variety of modes of the DES. Includes data encryption file by file, protection of data stored on disk or hard disk, and file authen tication to indicate whether a file has

Golden Bow Systems 2870 Fifth Ave., #201 San Diego, CA 92103 (619) 298-9349 List Price: For standard, \$80; for dehave, \$120; shipping, \$3 Requires: 64K RAM, hard disk

been altered. Not copy protected CIRCLE 848 ON READER SERVICE CARD

In Short: Partitions hard disks into multiple logical drives that can be password protected. Can write-pro tect and prevent downloading to a floppy drive. Deluxe version can par-

tition logical drives up to 390 Mbytes. Copy protected. CIRCLE 645 ON READER SERVICE CARD Watchdog, Version 4.1

Fischer Innis Systems Corp. 4175 Merchantile Ave. Naples, FL 33942 (800) 237-4510 (813) 793-1500 List Price: \$295 Regulres: 256K RAM, hard disk

In Short: Integrated security package. Uses proprietary algoriti Leaves encryption transparent to valid end user. Not copy protected.



FEDERAL AND COMMERCIAL SECURITY SCHEMES

The National Bureau of Standards' DES algorithm provides the most security. But proprietary algorithms work faster when complete security isn't required.

For most users concerned about data security, the solution lies among the commercially available security products that encrypt your files.

The lock-and-key method serves as the standard model for the vast majority of encryption algorithms used by these products. For a given password (or hardware key for hardware products), the algorithm generates a data-scrambling pattern based upon that password (or hardware key). Thus, a user's password serves as the unique key that decrypts the coded information

The public key system improves upon the lock and key method by allowing the use of two passwords: a public key and a private key. The public key generates the code that encrypts the data and can be

safely distributed. However, only the private key can decode the data

The National Bureau of Standards' Data Encryption Standard (DES) algorithm, required by the government for sensitive financial transmissions, provides adequate security for anyone outside the Pentagon. The price for this heavy shroud of security is paid in speed: most DES implementations try the patience of users accustomed to run-times of a few seconds. For this reason, the maiority of these programs can implement either the DES standard algorithm or their own proprietary algorithm. The proprietary algorithm sacrifices security for an increase in speed, giving quickand-dirty encryption for those who need it.--- David Grav

or typed. To use the file again, you simply go into BASIC and NAME it with a legal filename that DOS can handle. The only problem, of course, is that if you know this trick of using BASIC, a potential file snatcher may know it as well. To help ensure that no one knows that your file (with or without an illegal name) is on your disk, you must use DOS to hide it.

HIDING FILES AND DIRECTORIES Both files and even entire subdirectories can be marked as "hidden." A hidden file is one that simply doesn't appear if you take a DIR listing of the files on a disk. While DOS itself provides no direct means of making subdirectories invisible. DE-BUG will ably handle the task. Commercial byte-level editors make the chore even

easier. Hiding files with DEBUG takes a little work and can be dangerous because a misdirected command can wipe out a hard disk. Practice with an expendable disk before attempting this procedure on a hard Using BASIC. you can give a file you wish to protect an illegal filename.

disk or floppy containing important data. To hide a floopy disk subdirectory with DEBUG, first run DEBUG (which is included on your DOS Supplemental Files distribution disk). Next, assuming you want to work with the floppy disk in drive A:, type

L CS:0100 0 5 1 <Enter> This loads (L) into the current segment (CS) at memory location 0100, one sector starting at sector 5 of disk 0 (which is what DEBUG calls drive A:).

M.H.I. WAREHOUSE



FACT FILE

HARDWARE w Technologies Inc

17971 Skypark Circle, Suite E. Irvine, CA 92714 (714) 261-0228 List Price: \$200 Requires: DOS 1.1 or later. nort: Combines menu-drive software and hardware keys to implement either DES or a proprietary algorithm. Encrypts either text or bina-

ry files. CIPCLE 643 ON PEADER SERVICE CARD

FIXT/S Security Chip Golden Bow Systems 2870 Fifth Avc., #201 San Diego, CA 92103 (619) 298-9349 List Price: \$95; shipping, \$3 Requires: IBM PC-XT or compatible, hard disk drive In Short: Controls system and data

access by preventing system boot and disabling booting from floppy drives. Accesses files by password

ORCLE 642 ON READER SERVICE CARD PC Lock I and IV MPPI Ltd.

2200 Lehigh Ave. Glenview, IL 60025 (312) 998-8401 List Price: PC Lock 1, \$179: PC

Lock IV, \$299 Requires: One short-card slot, all ons of PC-DOS. In Short: PC Lock I allows up to 16 users to log on to total system access by ID and password; built-in Drive Lock prevents magnetic copy from C: drive to A: drive or B: drive; hard disk formatting protection. PC Lock IV controls access by read/write or

read-only; controls access to root-lev-

out generator

el subdirectories: full audit trail and CROLE MI ON READER SURVICE CARD

dustrial Resource Engineering Inc. 10 Gerard Ave., #209

P.O. Box 57 Timonium, MD 21093

(301) 561-3155 List Price: PC board version, \$495; synchronous or asynchronous standalone device for speeds up to 1,200 bps, \$559; synchronous or asynchro-

nous standalone device for speeds up to 19,200 bps, \$759. Requires: One slot or external mom for PC board version

In Short: Prevents unauthorized access to confidential files as data is

transmitted over public phone lines using DES. Also encrypts files on

CIRCLE 640 ON READER SERVICE CARD Secure PS

Winterhalter Inc. 3853 Research Park Dr. Ann Arbor, MI 48104 (800) 321-7785 (313) 662-2002

List Price: \$325; with Audit Trail. \$349; with MasterKey and Audit-Trail, \$475. Requires: One slot.
In Short: Provides board-level DES encryption that is 25 percent faster

than the software SECURE! PS (100K file in 13 seconds). MasterKey allows authorized personnel access CIRCLE 100 ON READER SERVICE CARD

SHERLOCK FIMAC Personal Computer Security

Module Analytic Con 1820 Michael Faraday Dr. Reston, VA 22090 (703) 471-0892 List Price: \$1,125 Requires: One DTE line. In Short: This hardware device vides DES standard encryption for

data transmission that is fully compliant with the Financial Institution Message Authentication Standard. Available as either an in-circuit or peripheral attachment

CIRCLE 636 ON READER SERVICE CARD HARDWARI SOFTWARD

Lock-It 1 and Lock-It 2 Security Microsystems Co 16 Flagg PL, #102 PC States Island NY 10304 (212) 667-1019

List Price: Lock-It 1, \$129.95; Lock Jt 2 \$79 95 Requires: IBM PC, XT, AT, or compatible (user must specify mod-

el), hard disk drive In Short: Lock-It I is a circuit board that fits on the motherboard without taking up a slot. Prevents boot-up until user-chosen password is entered. Includes software for optional harddisk-only boot and a free optional timed relock. PC and XT versions come with Quickon, a fast boot and true reset. Lock-It 2 is a software product for the PC, XT, AT, or com-

natible, which creates password-accessible subdirectories on a hard disk. Not copy protected. CINCUL 637 ON READER SERVICE CARC

Voyager Software Protection Voyager Development Inc. 412 S. Lyon St. Santa Ann, CA 92701 (714) 667-8128

List Price: \$90 Requires: One slot. In Short: Combining software and hardware, this device uses a proprietary algorithm to encrypt text and CIPCLE 636 ON READER SERVICE CARD

binary files. X-Lock 100 A Electronics Inc. 2137 Flinstone Dr

Tucker, GA 30084 (404) 491,8044 List Price: \$495 Requires: Hard disk drive, one short

slot. In Short: Half-card unit plus software. XFILES provides encryption, access control, and locking of files; XWARE provides management control by controlling access to prin hard disks and so on CIRCLE 495 ON READER SERVICE CARD

If you now type D and press Return DEBUG will display the root directory of the floppy disk. On the left side of the screen are the bexadecimal byte values of

the directory entries; on the right are the ASCII equivalents of these byte values. Each directory entry requires two 16character lines. The 12th character on the

first line of a directory entry is the attribute byte of its directory entry. The following are the most common file attribute byte codes:

00 or 20 Ordinary file Ri or Pi Read-only file 82 or 22 Hidden file 03 or 23 Read-only and hidden file [8 ordinary subdirectory 12 hidden subdirectory

To hide a subdirectory, then, you need only change its attribute from 10 to 12. To do this, determine the location of the attribute byte by adding a hexadecimal B (11 in decimal) to the right four-digit number in the leftmost column displayed by DE-

TOPS IN ITS CLASS. PROVIDES A NEW LEVEL OF CONVENIENCE FOR MS-DOS USERS. InfoWorld

Point. Shoot. Take Command.

Rip full throttle through your data with this timesaving control program from Peter Norton. The Norton Commander™software gives you a fast, powerful point and shoot method to perform your computer operations. Point to a directory and The Commander jumps to it. Point to your data file and The Commander runs your data with its matching program. Speed through listings, update files like lightning. Delete. Copy.



manage your disk. Add your own user menus for one-key operation. And it doesn't eat up your screen while it's doing it. Easy to use with keyboard or mouse. The Norton Commander. The quickest way to enhance your PC, and take command. The Norton Commander. Designed for the IBM* PC. PC-AT and DOS compatibles. At your software dealer or order direct for \$75* from Peter Norton Computing, Inc., 2210 Wilshire Boulevard, Santa Monica, CA 90403. 213-453-2361. Visa and Mastercard welcome.

Built-in sweep functions

ENORTON

THE QUICK AND EASY HARD DISK MANAGER

■ PC LAB NOTES

■ While DOS provides no direct means of making subdirectories invisible, DEBUG can ably handle the task. Commercial byte-level editors make the chore even easier.

BUG. If DEBUG shows 23E1:01C0 in the leftmost column of the row containing the subdirectory you want to hide, then the location of the attribute byte will be 01CA.

To change the attribute, type the fol-

lowing, substituting your own attribute location for OICA:

E Ø1CB

DEBUG will respond with the display

E #1CB:1#

Just type 12 and press Return to change the

subdirectory attribute to hidden.

As the final step, you write the new attribute back to disk with this command

W CS:0100 0 5 1 <Enter>

Now exit from DIBIUG by typing Q and pressing Beturn. You can use this same method to hide a file. Just add 2 to the file's heathful deal artiful to hide a file. Just add 2 to the file's contribute to make it hidden. If I midden, If I midden file a file is attribute to hidden seems or dicey way to proceed, you can use Charles Pet-solf's ATTR (COM, which appeared in the Programming/Ufilities column in PC Marazine. Valume S Number 1 I —Ed. I.

Your hidden directory will be invisible to DOS's DIR command, but pathnames containing it will remain valid. In addition you can change directory (CD) and otherwise use the hidden directory like any other. However, if interlopers don't know the name of the hidden directory, they won't even know that there are files stored in it, and thieves don't try to steal what they can't see.

WEED OUT EXCESS FILES WITH XDEL



If too many files have sprouted up in your directories, here's the easy way to clear out the unwanted overgrowth.

A though DOS stands for Disk Operating System, its limited versatility can make disk management more operation than system. As a result, disk management utilities and DOS shells are popular among users who want to isolate themselves from cumbersome commands and repetitive procedures. The trouble with such overall approaches, however, is that while they may simplify however, the stand while they may simplify options even more than does DOS. XDEI thus addresses only one specific

aspectar data administrating vide spectual aspectar and administration of the complication of the complished by repeatedly issuing the DIR command and differently entering DEL for each fife that needs to go. After deleting a few fifes, the directory listing scrolls off the screen and you have to repeat the procedure. Using wildeard names in DEL order to the control of the contro

No more. XDEL.COM lets you zip through your directories one file at a time, deleting superfluous files with a keystroke. It accepts a drive/filename specification to point to the correct disk and to select a specific group of files to examine. The syntax for invoking XDEL is

XDEL [d:][file.ext]

where d: is the drive specifier and file.ext is a filename that defaults to *.* if none is entered. Wildcard entries are acceptable, but path specifications are not, Use DOS's CD (CHDIR) command to make the target directory the current directory prior to using XDEL.

RUNNING XDEL When entered. XDEL clears the screen and displays the chosen drive, the current target directory, and the file-matching specification from which it will select files. Instructions for using the program are displayed, and the first file is listed. To delete the last file shown, simply press the F1 key. The filename will be flagged with a left pointer symbol (17h) if it has been successfully deleted, and the next filename will appear. Any read-only files in the directory will be listed but cannot be deleted: you'll get an audible beep if you try. To skip to the next filename, press the PgDn key. Should you skip over a file that you had intended to delete, pressing the Home key will restart the scan from the top. Hitting Esc allows you to exit at any time.

 XDEL.COM lets you zip through your directories one file at a

directories one file at a time, deleting superfluous files with a keystroke.

Wildcard entries are OK.

Five filenames will fit on each line. When the screen becomes full, XDEL leaves the instruction area intact, serolls the file area up halfway, and continues on. There are two error messages: if no matching files are encountered, a "File not found message" is issued; and if you entire a path specification or try to address a drive outside the range from A: through Z;. XDEL tells you four mistake and exits.

The assembly language source code for XDEL is shown in Figure 1. Readers who do not have a modern (see sidebar "Downloading XDEL") and who wish to create XDEL.COM by typing in and running a BASIC program should use the listing in Figure 2.

XDEL'S INNER WORKINGS XDEL requires DOS 2.0 or later because the heart of the program depends on the extended file management functions provided by the DOS Function Call INT 21h. To accomplish their assigned tasks, these functions utilize ASCIIZ character strings to specify drive, path, and filename information to the operating system. A traditional file management function, Function Call 029h, is available to parse the command line into an FCB (file control block), but this function will not handle path entries and is not particularly handy when using the extended functions. Unfortunately, DOS did not provide a similar routine within the extended file management functions when it introduced tree-structured directories. Therefore, program developers must derive the necessary information from the unformatted command line. This

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■ PROGRAMMING/UTILITIES

information is contained in the PSP (program segment prefix) parameter area that DOS builds in front of each program before relinquishing control to it.

XDEL starts out by capturing certain information it will use in its screen-handling routines. This is accomplished by means of the BIOS Video Interrupt, 10h. Loading 08h into the AH register before calling this interrupt causes it to return the value and corresponding screen attribute of the character at the current cursor position, along with the active video page. XDEL saves the screen attribute (unless it is predefined in the ATTR field) and the active page value for later use.

The unformatted area of the PSP is then parsed into the drive and file specification fields. The PARM_SCAN routine gets the next byte from the parameter area and compares it against a string of delimiter characters. If the zero flag is set upon return from the routine, the character returned in the AL register is a delimiter. This makes it easy to bypass these characters or to control processing by their presence or absence. If the drive is not specified, the default drive is determined with DOS Function Call 19h, whose code number is transformed into an alphabetic designator. If no file specification is entered, the default wildcard * . * filename is used.

Once the appropriate disk drive is determined, DOS Function Call 47h is used to retrieve the current directory, which is returned as an ASCIIZ string. This informa-

 Five filenames will fit on each line. When the screen becomes full. XDEL scrolls up halfway and continues on.

tion, together with the drive and file specifications, will be used to request directory information from DOS. The directory path may be up to 64 bytes long, should the current directory be several layers down in the tree structure. After clearing the screen (by

DOWNLOADING XDEL

The programs that appear in our Programming/Utilities column (as well as other programs we publish) can be downloaded by modem from the PC Magazine Interactive Reader Service. There is no charge for this service, but users are cautioned that these programs are copyright material and are made available only for individual, noncommercial use. Making copies for others (including placement on other electronic

XDEL.COM AT A GLANCE

Syntax:

XDEL [d:][file.ext]

Operations

Deletes current file <F1> displayed

<PgDn> Skips current file displayed <Home> Restarts file display

< Fsc > Returns to DOS

bulletin boards), with or without charge, is a violation of the Ziff-Davis copyright.

The modern number for PC-IRS is (212) 696-0360. Set your modem and communications software to use 1200 (or 300) bps, 8 data bits, 1 stop bit, no parity. PC-IRS files with a .COM, .EXE, or ARC extension require the Xmodem error-checking protocol; our other files (e.g., with extensions of .ASM or .BAS) can be downloaded using either regular ASCII or Xmodem transmission.

XDEL.BAS, whether typed in from the magazine at your keyboard or downloaded from PC-IRS, will automatically create XDEL.COM when run once in BASIC. XDEL.ASM, listed both here and on PC-IRS, allows you to modify the program but requires you to use a macro assembler (IBM or Microsoft) and the following commands:

> MASM XDEL LINK XDEL: EXE2BIN XDEL XDEL.COM

-Craig L. Stark

using another BIOS video function call) and displaying the heading, target directory path, file specification, and instructions, the program starts searching for files that match the request.

SEARCHING THE DIRECTORY DOS provides two handy functions for accessing directory information through the Interrupt 21h Function Calls 4Eh and 4Fh. Function Call 4Eh requires a filename parameter in the form of an ASCIIZ string and a file attribute code. The file attribute may have various values that indicate whether a file is a read-only, a hidden, or a system file, a volume label, a subdirectory, or an archived file. Function Call 4Eh returns the first file in the directory that meets the requirement, while 4Ph will find all subsequent files that match. DOS writes information about each file it finds into the current Disk Transfer Area. This information includes the name, date, time, size, and attribute of the file. (On entry to any program, DOS sets the Disk Transfer Area to occupy the same space as the unformatted parameter area of the PSP.) Function Calls 4Eh and 4Fh will return with the carry flag set if no more files match the selection criteria.

MAKING YOUR CHOICE After each filename is displayed on the screen, the program waits for a keystroke to indicate what action to take next. The GET_KEY routine uses another BIOS interrupt (16h). which retrieves a keystroke from the keyboard buffer or (if the buffer is empty) waits until one is entered. Certain key combinations generate so-called extended key codes, which are handled differently from "normal" key codes. These special key values are marked by a zero (instead of the character value) in the AL register after the interrupt routine. The extended value appears in the AH register and is used to determine which key(s) were depressed. GET_KEY accepts all extended key codes



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PROGRAMMING/UTILITIES

VICTOR DOD 1841 STORY STORY DEPO NOTED DEPO N	TITLE	XDEL. ASN	SCANS CURRENT DIRECTORY AL COMMANO LINE SPECIFISS FIL	LOWING FILE DELETION. E MATCHING MASK
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MANUAL Media STE	CSEG		CS:CSEG, OS:CSEG, ES:CSEG,	SS:CSEG
SAME STEE	PARN			JUNFORMATTED AREA OF PSP
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ANGEL 80 **ATTA-** **COMMOND THE ORDITATION OF THE SAME PARTY (APPL AND		PIP.	Scorneriobs 1886 Sidd-David	Bublishing Co. 5 18h
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COUNTY DO S	Name of Street			PATCH POINT TO PRESET
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DATE_BEC 18 1 DUPY1 STATE	DELIM	DB	9," .;="	COMMAND LINE DELINITERS
NATI_SEC 10 1/46 OFF(8.8) CORRECT DATE OF CONTROL NATIONAL CORRECT DATE OF CONTR	ORIVE_N	o ps	7	JOISE DRIVE (8-A, ETC)
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MOV AN. 8198 GET CHRENT DRIVE (8-A. ET		JMP	STORE_DRIVE	SKIP OFFAULT ORIVE CHECK
MOV AN. 8198 GET CHRENT DRIVE (8-A. ET	GPT DRT	ur.		
INT DOS ; THRU DOS CALL	451_DKI	MOV	AH. 019B	GET CURRENT DRIVE (8-A.ET
		THE	DOS	TERU DOS CALL

(Figure I continues)





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■ PROGRAMMING/UTILITIES

AL, 'A' IVE: CHP AL, 'A' VALID RANGE OF ORIVES , INVALID DRIVE

JB CHP SPEC_ERROR DI, DPPSET DELETE_PATH

DI, OFFSET MATCH_FATS AL.'A'

JE GLOBAL_SCAN MOV CX.12 PARSE

> CALL PARK_SCAN JE CHP PARSE AL, I3 END_SPEC AL,'\'

END_SPEC

ENO_SPEC: BYTE PTR [DI] . # GLOBAL_SCAN:

RESTART: CALL CLR_SCR CALL DX, OFFSET SER PRT_ASCIIE MOA

CALL CALL DX, OFFSET MATCH_PATH + 2 PRT_ASCLIZ CALL DX, OFFSET INSTR HOV DX.DPPSET MATCH_PATE CX, 8

ERROR_RTN FILE LOOP:

CALL ADD

READ_KYBD: CHI

EXTENDED MEY TESTS CHE AL,59 JE

JHP 171_130

DRIVE_NO, AL SYTE PTR [S1],13

GET PATE

DX,OFFSET PATH_MSG PRT_ASCIIN DX,OFFSET DRIVE_SPEC PRT_ASCIIE -DX,OFFSET PATH_SPEC PRT_ASCIIE

DX,OPFSET FNAME PRT_ASCIIZ

COUNT, 1 GET_KEY AL, 27 END_PGH

DEL_IT AL,71 RESTART JE CMP JE AL,81 SKIP IT READ_KYBO

SI, OPPSET PHAME

CRANGE TO LETTER ORIVE SPEC SEPARATOR

> SAVE DRIVE SPEC AND "1" DELETE RTN PATH ; FILE MATCHING PATH :LOAD DRIVE

: CHG ORIVE TO NUM (#=A, ETC) SAVE DRIVE CARRIAGE RETURN ? YES, SCAN ... MAX LENGTH PILE SPEC

GET NEXT PARM SYTE SKIP DELINS CARRIAGE RETURN? 1YES, END OF FILE SPEC 1FATH SPECIFIED? 1YES, ERROR MOVE SYTE TO MATCH PATH COUNT FILE SPEC LENGTH

TRAILING TERO GET PATH FOR DRIVE SPEC

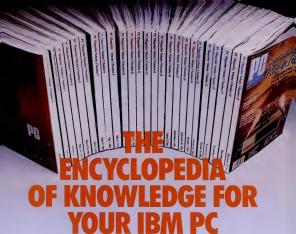
CLEAR SCREEN SCREEN TITLE LINE AND PRINT DIRECTORY INFO MSG AND PRINT DRIVE/MTH/PILS AND PRINT PATH_SPEC AND PRINT

; AND PRINT :INSTRUCTION LINE , AND PRINT INITIALIZE FILE COU | INTIALIZE FILE COUNTER | ADDRESS OF SEARCH MATCH | ATTRIBUTE FOR FILES | FIND FIRST MATCH | THRU DOS FUNC CALL | CARRY SET = ERROR

POINT TO FILE NAME AND PRINT ICX = FILE NAME LENGTH INCREMENT COUNT TOST KEY INSTRUCTION PESCAPE KEY?

FUNC KEY 17 PROME KEY? 1YES, RESTART 1PAGE DOMN? 1YES, SKIP TO NEXT FILE NO, IGNORE KEY SAVE FILE NAME LENG

(Figure I continues)



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■ PROGRAMMING/UTILITIES

	HOV	DI,OFFSET DELETE_FATH + 2 CX,13	DELETE PATE FILE SPEC
REP	POF	α	PRESTORE FILE NAME LENGTH
	JC	DEL_RTN SOUND_ALARM	CARRY SET - NOT DELETED
	MOV CALL INC JNP	DL,817 PRT_CHAR CX SKIF_IT	; "LEPT POINTER" CHAR ; AND FRINT ; INCREMENT STRING COUNT ; SKIP TO NEXT FILE
OUND AL	ARN:		
	MOV	DL , 87	CTRL-G "EEEP" CHAR
	JMP	PRT_CHAR READ_KYRD	FRINT FREAD KEYBOARD AGAIN
RIF_IT:			
	CALL	SPACE FILL	POSITION FOR NEXT NAME
	CALL	NEXT_FILE	FIND NEXT FILE MATCH
	JC	END_PGN	CARRY SET - NO MORE FILES
	CMP	COUNT, 80	FO FILE NAMES DISPLAYED?
	JE	FILE_LOOF	IND, SEIF SCROLL
	CALL	SCRDLL_HALF	SCROLL HALP DF WINDOW
	JNF	COUNT, 48 FILE_LOOP	SUBTRACT 48 FROM FILE COUNT SEEEP GDING
SEDR_RT	H:		
	MOV	DX.DFFSET NOT FOUND	POINT TO MSG
	CALL	FRT ASCIIS	AND PRINT
ND PGN:			
	INT	288	RETURN TO DOS
		* * S D B R D U T I N E S * *	

GET NEXT PARAMTER EYTE AND COMPARE AGAINST DELINITER TABLE

ZERO PLAC INDICATES BYTE IN AL IS DELINITER PARK_SCAN I

PUSH PUSH LODGE HOV cx DI DEFESET DELIM REPRE SCASE POP POP RET

E2

GET EYES AT DS: (EI) LENGTH DF DELIN STRING SCAN DELIM UNTIL CK-0 OR AL-DS:[DI]

GET CURRENT DIRECTORY PATH FOR DRIVE SPECIFIED

GET_FATH: PUSH ISAVE INDEX TO COMMAND LINE AH,847H DL,DRIVE_NO GET CURRENT DIRECTORY
GET DRIVE NUMBER (\$-A,ETC)
DL = (\$-DEPAULT, 1-A, ETC)
SAVE DIRECTORY TO DS:[E] MOV INC SI, DPFSET PATH_SPEC + 1 ASCIIS SERO AYTE [SI],AL ROOT_DIR CHECK IF ROOT DIR DI,SI CX,64

ECAN PATH FOR SEX 8 ENTRES TO SEARCH FOO SEARCH FOR TRAILING SERD FOUNDED FOR THE SEARCH POWERLAY WITH EACK SLASH JAPPEND TO PATH DI AL.'\' ROOT_DIR:

PRESTORE INDEX

PINDS NEXT FILE NAME WHICH MATCHES MASE NEXT_PILE:

CX DX,DFFEET MATCH_PATH CX,8 AH,84FH DOS

ADDRESS OF MATCH STRING ATTRIBUTE FOR FILES FIND MEXT MATCH 1005 FUNC CALL

(Figure 1 continues)

SPACES OUT FILE NAME TO LENGTH OF 16 EYES (PIVE NAME PER LINE)

EFC_EXIT DL, ' PRT_CHAR CX CALL SPACE_PILL SPC_EXIT:

PRINTED 16 BYTES? INO, PRINT SPACE AFTER NAME INCREMENT CX (STRING COUNT)

PRINTS ASCIIS STRING POINTED TO BY DS:DE

PRT_ASCILL: BI ASC LOOP DL, SYTE PTR [SI]

INIT BYTE COUNT POINT TO CHAR IN ASCIIE

ASC_EXIT YES, EXIT POINT TO NEXT EYTE INCR SYTES PRINTED ARC LOOP

PRINTS CHARACTES IN DE

PRT_CHAR:

PRINT CHAR IN DL ACCEPT ONLY ESCAPE, AND ALL EXTENDED KEY CODES

GET KEY ;GET NEET REYBOARD CHAR ;BIDS CALL ;ESCAPE REY? ;YES, EXIT 16R AL,27 INT

ET_EXIT EXTENDED ERY? JED, IGNORE JEMAP SCAN CODE INTO I GET_KEY

GET_EXIT:

THE FILE NAME IN FIELD "PHAME"

CARRY FLAG SET - FILE COULD NOT BE DELETED

CARRY FLAG CLEAR - FILE WAE SUCCESFULLY DELETED

POINT TO DELETE DELETE FILE PUNC CLEARS ENTIRE SCREEN AND POSITIONS CURSOR IN UPPER LEFT CORNER

CLR_SCR:

SET CURR PAGE ATTRIBUTE TO EE
SCROLL UP SIDE PUBC.
UPPER LEFT WINDOW CO.
LOWER RIGHT CORP.
SIOS CALL

SCROLLE TOP EALF OF FILE DISPLAY AREA AND POSITIONS CURSOR ON BLANE LINE

ON LINE 15 (Figure 1 continues)

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PROGRAMMING/UTILITIES

RR,ATTR AX,0600R CX,0700R DX,1850R ATTRIBUTE TO RR UPPER LEFT CORNER OF WINDO E TOS CALL CERG (Figure I ends)

BASIC PROGRAM TO CREATE MDEL.COM

100 110 120 130 140 150 160 170 REM - BASIC FROGRAM TO CREAT OPEN "EDEL. COM" AS \$1 LEM = 1 FIELD \$1,1 AS A\$ CHECKSUM = 8 FOR I = 1 TO 116 LIMESUM = 8 FOR J = 1 TO 8 READ RYTES CRECKBON = CRECKBON + RYTER LINESUNR = LINESUNR + RYTER 1F (DYTER < 256) THEM LIST POT 81 REXT JR 160 160 200 218 228 AS - CERS(RYTER) READ LINECHECES

IF LINECHECES O LINESUMS THEN PRINT "RITOR IN Line";288 + 18 * IS IF LINECHECKS O LINESUMS THEN P MEXT IS CLOSE IF CHRCKSUM = 88168 THEN PRINT "Suc PRINT "COM file is not valid!" - EM 258 268 228 228 332 332 333 348 418 418 448 448 448 455 552 553 5555 5555 5555 END 1884 622 588 762 782 483 287 153 112, 46, 102, 80, 110, 65, 32, 92, 114, 56, 68, 90, 32, 84, 59, 9, 9, 9, 9, 9, 185, 9, 05, 0, 0, 0, 0, 0, 0, 0, 0, 0, 101, 116, 0, 0, 0, 0, 0, 0, 0, 0, 0, 116, 118, 9898896583222 5123232566685542387714864348484116448 46, 111, 114, 32, 32, 32, 186, 32, 45, 32, 188, 103, 120, 109, 70, 101, 115, 32, 182, 99, 32, 45, 185, 184, 32, 13, 116, 100, 97 101 105 110 32 116 205 205 205 590 590 600 610 620 630 640 110, 32, 32, 10, 205, 205, 111 32, 32, 60. 07. 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 205, DATA 285 205, 205, 205, 658 668 678 688 699 718 728 738 748 759 778 16 46 16 46 16 46 16 46 16 46 16 46 16 46 5 5 4 26 5 7 2 5 6 7 7 6 8 205, 205, 205, 205, 205, 205, 13, 32, 62, 32, 116, 205, 205, 205, 205, 73, 32, 68, 80, 85, 18, 32, 32, 67, 82, 73, 114,

67 68

121, 110, 100, 100, 101,

32, 13, 111, 58, 18, 116, 13, 752 84 753 585 721 649

(Figure 2 co

Figure 2: A BASIC program that will automatically create XDEL.COM.

100,

111, 16, 101, 114 32 32 110

181

10

101, 70, 32, 10, 32,

1818 DATA 1828 DATA 1838 DATA 1848 DATA 1858 DATA 1858 DATA 1878 DATA 1888 DATA 1898 DATA 1188 DATA 65, 25, 251, 149, 5, 186, 288, 186, 78, 232, 92, 237, 23, 186, 1, 202, 186, 51, 8, 108, 68, 68, 158, 243, 178, 11 48 11 58 DATA 1160 DATA 1170 DATA 1190 DATA 1190 DATA 1288 DATA
1218 DATA
1218 DATA
1228 DATA
1238 DATA
1238 DATA
1238 DATA
1238 DATA
1238 DATA
1248 DATA
1258 DATA
1278 DATA
1478 DATA 144, 232, 128, 169, 165, 32, 5, 188, 198, 4, 242, 81, 79, 115, 178, 98, 62, 186, 81, 71, 62, 116, 176, 285, 243, 138, 23, 232, 235, 205, 105, 66, 194, 56, 195, 189, 16, 65, DATA

235, 235, 232, 50, 50, 6, 757 1025 921 962 971 567 887 742 196 198 198 195 33, 0, 10, 36, 130, 232, 141, 91, 13, 114, 235, 1818 868 1812 232, 132 114, 235, 114, 175, 48, 936 131, 27, 43, 688 1158 1833

and the Escape code (1Bh). The main program loop checks the value returned from GET_KEY and branches to the appropriate part of the program. Although DOS itself provides an interrupt to read the key-board, the BIOS interrupt is more useful here because the DOS routine may not take the appropriate action if ANSL SYS is loaded and keys are redefined for DOS.

BE CAREFUL WITH F1 When you want to delete the last file shown on the screen, hitting the F1 function key starts the ball rolling. XDEL builds an ASCIIZ string by concatenating the filename to the

drive specification and then using the DOS function Call 4H. DOS sets the carry flag if the file cannot be deleted (e.g., is read-only). When the file is deleted, a left point-or symbol is written to the screen and the text file is displayed; otherwise, a beep tone is generated by instructing DOS to "write" a hear Orl character and the cursor "write" is hear Orl character and the cursor description of the cursor of the

(Figure 2 ends)

turn all associated disk sectors to the available pool. Until those sectors are used nower flies or updates), it is possible to rebuild the directory entry and reesslabils the FAT information by using utility programs like Peter Norton's Unerase. Even so, be advised that Fi's effect is instantaneous and that resting your elbow on the Fi key is definitely inadvisable.

SCREEN-HANDLING ROUTINES XDEL counts the number of filenames currently displayed, and when the screen fills up, its lower part is partially scrolled

Ambitious programmers could enhance
 XDEL for operations like renaming a file or changing its attribute.

without disturbing the screen header information. This is accomplished by specifying a window area to be scrolled and then invoking the BIOS Video Interrupt. The window is defined by providing the upperleft and lower-right row and column positions of the area to be scrolled. All text displayed on the screen is handled by the PRT_ASCIIZ and PRT_CHAR routines. PRT_CHAR utilizes the DOS display output Function Call 02h. PRT_ASCIIZ relies on the SI register to provide the starting point of a character string to be printed and proceeds to the next byte until a zero byte is found. The SPACE_FILL routine is simply that: it pads the filenames to the same length, thus facilitating their presen-

Ambitious programmers could enhance XDEL to allow for such operations as renaming a file or changing its attribute. Maybe an XDEL Version 1.1a will do these things—or perhaps the next version DOS will.

to exit at any time.

Ronald Czapala is a COBOL programmer who has acquired much of his assembler knowledge from these columns.

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A typical DBMS user's screen, after the 497th line of code.

ith most database management soft-mare for the IBM PC family and compatibles, you're quickly confronted with a painful reality: the only way to make your package live up to its promise is to learn its programing language. Which can take months. Then you have to write the code, line after frustraing line.

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A data entry screen designed without programming, using Forms EXPRESS.

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SPREADSHEET CLINIC



Converting numbers to words, how to make better best guesses with @NA, and an autoexec macro that runs on the Friday before the end of the month.

FRACTIONS TO DECIMALS

In the Spreadsheet Clinic of April 15, 1986 (Volume 5 Number 7), you included a method for entering sock prices without converting the fractional part to a decimal. The technique is to meter a number such as 8½ as the formula 8±½, which will appear in the cell as 8.4375. This is a lot easier than calculating the value 6½ is before entering the entire number as chefor entering the entire number as same thing with fewer keystroks.

Assume that you must enter the fractional values contained in column C. You would enter the data as in column B, that is, the integer part of the column C value with only the numerator of the fraction as the number following the decimal point.

The formula in column E converts the column C numbers to fractions. You put the denominator common to all the fractions in cell E3 and copy the formula in cell E8 down the column. The only thick is remembering to enter 8½, for example, as 44, since ½ is the same as ½. If you need to use a different denominator, such as 16 or 32, just put in cell E3.

Don Harris Friendswood, Texas

Not so fast. This method works fine for single-digit denominators, but not for twodigit denominators, such as 'n's When you have a two-digit denominator, you can also get a two-digit numerator, which means you get two digits to the right of the decinal place when you enter you data. Thus you have to multiply by 100 in your equation instead of by 10.1 have included

	c	D	
3	DENDMINA	TOR -	
5 6 7	PRACTIONAL	DATA	CONVERTED
	VALUE	ENTRY	ATAG

8	8	8	8.888
9	8 1/8	8.1	8,125
16	8 1/4	8.2	8,250
	8 3/8	8.3	8,375
12	8 1/2	8.4	8.588
13	8 5/8	8.5	8.625
14	8 3/4	8.6	8.758
13 14 15 16	8 7/8	8.7	8,875
16			9.888

eint(D8)+(D8-eint(D8))*18/SE\$3

ALTERNATE EQUATION FOR CELL ES = @INT(D8)+(D6-6INT(D8))/SE33*@IF(@LENGING(\$E53.8))>1,183,18)

Figure 1: A way to enter fractions as decimals to get decimal values.

an alternative equation that tests for the length of the numerator and multiplies by 100 or by 10 as necessary. If you use this equation, though, you must enter 35th as 3.03 rather than 3.3 because 3.3 will be treated as 330/s.

SKIPPING CELLS WHEN YOU COPY I have used 1-2-3 and Symphony for several years but only recently discovered how to copy cell contents along rows or col-

umns while skipping every other cell.
To illustrate the process, enter the number 1 in cell A1. In cell A3 type in the formula + A1+1. Now do a /Copy, specifying A3. A20 as the source range and A5 as the destination range. The formula will be copied into every other row, through A21. If you want to put two blank rows between every copied formula, just enter + A1+1 in cell A4 and make A7 your destination

This technique works whether you copy ranges or single cells and whether you copy vertically or horizontally.

Robert DePriest Nashville, Tennessee

Amazing but true! There must be some quirk in the Lotus copy algorithm thot in effect lets you enter the destination range as the source range. The technique is perfect for those ticklish situations in which you must change every third or fourth column or row. Nice tip.

NUMBERS TO WORDS

Figure 2 shows a macro that will parse dollar values up to \$999,999,999 and write them out in words. Put the number in D3, hit Alt-C, and the words will appear in D5. Be sure to include the lookup table and all the range names as specified. This macro will work with Symblogy or Release 2.0 of

■ SPREADSHEET CLINIC

1-2-3; it is an adaptation of a dBASE II routine by Alan Simpson.

Peter R. McBride Moorpark, California

Mr. McBride included some brief program comments with his submission, but I left them out so that the listing would fit on the page. Hard-core macro decipherers will have fun with this one.

BETTER-GUESSING @NA The @NA function in 1-2-3 is useful when

on the control of the

An alternative solution is to give any best-guess cells the +/- format. That way you can tell at a glance which cells are guesses, but their values will feed correctly through to the rest of the spreadsheet.

If you're not willing to hazard a guess at data that 'sy et come, you can always enter a label such as MISSING' instead of a number. In Release IA, at any rate, the label will be treated as a zero. This method of handling the label will understate totals and will also throw off any averages you may be calculating with this data. To correct the average you can multiply it by a correction factor as follows:

@count(range being svaraged)/(@count(same range)=(no. of missing values))

One good way to correct both problems is to let the data you dron't yet have. If, for example, you have a hole in a column of murbers, plug it with @wsyRANGE, using the entire column as the range. This will give more-realistic totals and will not change averages. Unfortunately, it will also give you a CIRC message. If you don't have any other circular errors in your worksheet, just consider the message are minder that you have incomplete data. It's



Figure 2: A macro that converts numbers into words.

also a good idea to flag the cell with the +/format so you can find it easily.

When you first use @avg(RANGE) to fill in the blanks, its value may be slightly different from any other average you have calculated for that range. This is because of the circular reference; the values will converge after a few recale.

John Predmore Fairport, New York

You can use Mr. Predmore's @avgRANGE) Isensique even if you have
more than one hole in a column of numbers. Nine out of ten figures in a column
could be @avg(RANGE) and the method
will still work—in just takes more recalcs
before all the values in the column take on
the value of the on piece of red data. And
if you're really hurting for data, enter
A more convincional was to keep @NA

sheet is to control it with @ISNA. Thus, if you expect that B7 is likely to be NA, you could put something like this into a cell:

@if(@isna(b7),F4,500)

That way, if B7 turns out to be NA, you'll get the value in F4. Otherwise you'll get the number 500.

MORE ON AUTOEXEC MACROS

In Spreadsheet Clinic for March 25, 1986 (Volume 5 Number 6), you ran an item about controlling 1-2-3 autoexec macros so that they would run on Fridays only. In Volume 5 Number 14 you included an autoexec macro that will run only at the end of the month.

before all the values in the cohumn take on the value of the on piece of real data. And much spot of a business that operates on a day (you're really huring for data, enter (@wgRAMCE) in the testh cell, too. A more conventional way to keep @MA from numine will through you are seed to ensure that the macro will run on the preference manine will through you are seed seeding from the preference of the piece of the preference of the piece of the preference of the piece of

Figure 3 solves the problem. The formulas in cells D3 through D7 are formatted as text, but each is a simple true/false test that evaluates to 1 or 0. FRIDAY _TEST will be 1 only on Friday, LAST _TEST will be 1 if today is not the last day of the month. The other two formulas also will be I if the last day of the month doesn't fall on the day following today or on the day two days from today. The autoexec macro decides whether to run by

The first line aborts the macro if today is any day other than Friday (FRIDAY _TEST=0) and it is not the last day of the month (LAST_TEST=1). The second line aborts the macro if all the test formulas evaluate to 1, making the sum in STOP _TEST equal to 4. STOP_TEST equals 4 when all of the following four conditions are true:

(1) Today is Friday.

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evaluating these formulas.

(2) Today is not the last day of the Figure 3: An autoexec macro that runs only on the last weekday of the month.

(3) Tomorrow (Saturday) is not the last day of the month.

(4) Two days from today (Sunday) is not the last day of the month. With these two sets of restrictions on its operation, the macro will run only on the

last weekday of every month

Very nicely done.

Michael Frank Hudson, Ohio

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c eMOD(eTODAY,7)=6 eDAY(eTODAY)<eDAY(eTODAY+1) eDAY(eTODAY+1)<eDAY(eTODAY+2 FRIDAY_TEST DAY(@TODAY+2)<@DAY(@TODAY+3) /mifriday_TEST=##and#LAST_TEST=1"/mq /misTOP_TEST=4"/mq . Regular Autoexec Macro ontinues Here . . .

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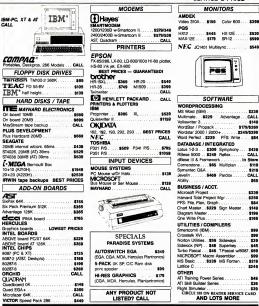
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7.

Power user

Adapting PSET.COM to control printers from dBASE, undocumented features and fixes for Microsoft Word, and bringing SideKick's Notepad up to date.

WOBEND DAY CALCULATOR
The encloved program. WORKDAYS FRG (shown in Figure 1), use
(ABASE'S DOW) function to calculate
elapsed business days (excluding weakends and company holidays) between any
two dates. This is very useful, for examtwo dates. This is very useful, for examted the program of the program of the process insurance claims, how long it takes to
process insurance claims, how long it takes to
process insurance claims, how long it
takes for sales to show up in bank dyeologies,
etc. It can also help in projecting lead times
for scheduling production or in writing
for scheduling production or in writing

etc. It can also help in projecting lead times for scheduling production or in writing proposals.

If you declare the opening variables PUBLIC rather than PRIVATE, the results will be available to the calling pro-

gram.

Shirley Chin Newark, New Jersey

Ms. Chin's program is indeed useful, and to widen its possibilities further I've added a few lines so you can use It to forecast a future promise date, and also so you can pass the parameters as date variables as well as character strings. The resulting program handles a variety of inputs. To use WORDAYS.PRG for calculat-

ing business days elapsed, you pass two parameters—the start and end dates—to the program:

DO workdays with "84/86/86","85/86/86"

Note that the final /86 may be omitted from either or both character strings. You can also pass date variables: dBASE's TYPE() function is used to determine what kind of input you've passed, and, if it's a

string, it is converted to date format. The five lines of code in Figure 1 that begin IF LEN(p1)=5 can be replaced with this oneline IIF() statement if you're using dBASE III Plus:

If you'd like to use WORKDAYS to calcu-

late promise dates, the first parameter is

the start date as shown above, and the sec-

ond is the number of business days until

*** WORDLYT, FFG Chick has days singmed, peak of future "plot of the state of the s

[F TTR('p2')\$'CD'
'if p2 is a string or data...

JF TTFE('p2')='C'
JF LEN(p2')='C'
p2-CTCD(p2'->'-STR(YEAR(DATE())-1988,2))
ELSE
p2-CTCD(p2')
EDG1

DD1
'is come a data

INDIF jol is now a data startupi DO NEIL startupi IN STIL (DOM (atart), 1) 8'23456' .AND., NOT. SUBS(DTOC(atart), 1,5) Sholidaya dayawdayahi ENDIF ENDIF

ENDDO
7 "Mork days between",pl,"&",p2,"---"+STR(days,4),"days."
LSE
* if p2 was a number...

7 pl. "plus" +STR (p2,4) +" work days: ", and

END I'

Figure 1: A dBASE III procedure to calculate business days elapsed and/or future promise dates.

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■ POWER USER

The program will return 07/17/86, 35 weekdays (excluding Memorial Day and the 4th).—Brad Stark

PSET IN dBASE

Since most of the work in our office is done in ABASE. If using four different printers, I translated John Dickinson's excellent PSET. COM, (Power User, Volume 5 Number 8) into ABASE. PSET. PRG (hown in Figure 2) can be called from the dot prompt or directly from a program, and the syntax is the same as for PSET COM, with one exception: in ABASE, the control codes are passed as a parameter, so emple, the sequence ESC E ESC G sample, the sequence ESC E ESC G seem plassized. To send this command in ABASE you use

. do pset with *27 69 27 71*

The control codes are accepted by the printer without moving the printhead, so you can change type sizes or enhancements on the same print line—up to dBASE's built-in limitation of 264 characters per command line. The CONSOLE is SET OFFs so the proceedings don't muddle up your screen with that screwball crew of characters under CHHR(32)!

Edie Coletti Cohasset, Massachusetts

It's certainly handier to call PSET.PRG than to RUN PSET.COM, even if you have the memory available. It's faster, too. I

*** FEET. PSG - Sends codes to a printer PRIV incoming.pset,loc,seg PSAA incoming pset-incoming DO WHIL ** Spect loc-AT(* *,pset) seg**CRIV(**SURE(pset,1,loc-1)+*)*

seq="CHR("+SUBS(pset,1,loc-SET FRIN CM ?? 4seq SET FRIN OFF pset=SUBS(pset,loc+1)

SHOP (CRI("speets")"
seq="trial or sequence of trial or sequence o

• Frinter must be online

Figure 2: This dBASE III program sends control codes to change printing characteristics—even in the middle of the same printi line. gather Ms. Coletti cares about speed since she writes her code in the lean-and-mean style—with four-letter abbreviations, short variable names, tight indents, and comments under the RETURN where

dBASE won't hang around reading them. I hope she won't mind my adding the line "pset=incoming". In this way, the incoming parameter doesn't get eaten in the DO WHILE loop, So, for example, you

could

. STOR "27 69 27 71" TO dublbold
. DO PSET WITH dublbold

Notice that if you're passing a memory variable as the parameter, don't enclose it

■ The PgUp/PgDn trick is an undocumented feature of *Word*'s window color

in quotes. If you do, PSET will dutifully shout CHR(dublbold) at your printer and—worse—your printer will hear!

There's a lot you can build onto PSET if you want to. You could STORE complete sets of parameters at the beginning of a program or in a procedure file. Or you could save them in a MEM file, RESTORing them as needed. This is what I've done—i's very useful if you often switch between printers—Bard Starters—Bard Starters—Bard

EGA GETS THE WORD

selector logic.

Ped George 18 THE WORD (19 discovered arrick this useful to people who Provide George 18 The George

The solution is easy enough that you can fix the problem even if you can't see what you're doing. Press the Esc key to ac-

tivate Word's menu, select Window Options (using first the W, then the O, keys), then press the Tab key once, at which point you will have selected Background Color. Press any cursor key to get Word's color har menu.

Now for the trick: Press the PgUp and PgDn keys to reset the palette to the color you want. You'll find yourself looking at 64 color choices, which is a nice find all by itself. When you return to Word's text screen, you'll find that everything has cleared up.

Bradley Dyck Kliewer Minneapolis, Minnesota

Good detective work! The PgUp/PgDn trick is an undocumented feature of Word's window color selector logic. You can also use it to set the menu color by selecting it first, then selecting a primary foreground color in the usual way.

There are two changes you should be aware of when you negrade to Word 3.0. First, there is a new (again, undocument of ley combination that causes Word 3.0 to repain the screen after a resident process and shift, along with the backshall type. Unfortunately, that doesn't always work with Sidekike, kiloloogis it does with other programs, such as Prokey 4.0), so Mr. Klewer's trick will again have to be used. Words 3.0, however, require three presses. Words 3.0, however, require three presses when the will always the selector in the Window Option menu.

PATCHING SIDEKICK'S NOTEPAD

—John Dickinson

If you use SideKick's Notepad for letter writing, you'll find its time and date-samp feature can be very useful. Typing Crt-Q-T automatically enters the time and date in the letter. Alternatively, if the Notepad window is saved with the entry "LOG" are column 1 and row 1, the time and date will be entered every time the window is opened.

This feature can be even more useful for letter writing if you patch SideKick to enter the date without the time. Put a disk with DEBUG in drive A: and a copy of Side-Kick, Version 1.52, in drive B:, and type in the following from the A> prompt. End each line with a carriage return, including the blank line between NOP and W.

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■ POWER USER

DEBUG SK.COM A 46F4 JMP 472A NOP

Ctrl-O-T or the .LOG command will now retrieve the date only.

Also, in some countries, the standard format for the date is day/month/year instead of the American format of month/ day/year. This is another easy patch to

 If you use SideKick's Notepad for letter

writing, you'll find its time- and date-

stamp feature can be very useful.

make, either by itself or along with the first patch. Follow the same procedure (there are two blank lines this time), typing in the lines below:

DEBUG SK.COM A 4739 MOV BL. DL.

A 4745 MOV BI. DH

Ctrl-Q-T or the .LOG command will now retrieve the date in day/month/year format.

Name Withheld

Both these patches work as advertised on SideKick, Version 1.52a. For those who haven't used the .LOG feature, be forewarned that the LOG must be in uppercase, and the file must have been saved with the .LOG extension before the feature does anything .- M. David Stone

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SAFETY FIRST

Before upgrading to dBASE III Plus, you should first install the program in a separate subdirectory so you can test whether your existing Version 1.1 programs will still run. If you want to run Plus with your old programs, one immediate change you'll want to make is to remove the STA-TUS = ON and HELP = ON lines from Plus's standard CONFIG.DB file.

By installing Plus in this tentative way. you can switch back to the older, tested version simply by loading it from its own directory. Later, when you're absolutely convinced, you can deinstall both versions and put Plus on the normal directory from which you've loaded dBASE in the past. Nolen Richardson

Hartsville, South Carolina

Right on. As its name implies, there is far less difference between dBASE III Plus and dBASE III than between III and II. In fact, there is very little in the new version that will cause problems with your older programs-but there are some gremlins!

For example, SET COLOR TO comunands now use letters instead of manbers. Any applications that use screen enhancements such as underline or reverse video for clarity unust be revised; and, once revised, they won't run properly in the older dBASE.

There's no free lunch and no free feature. Plus takes more than twice as much disk space-up from 149K to 312K. The old standard workstation-a dual floppy system with dBASE and applications proerams on drive A: and data on drive B:-is strictly a thing of the past, dBASE III Plus takes more operating memory, too. If you have only 256K, you're up a creek: while Ashton-Tate supplies a paddle in the form of a bare-bones CONFIG.DB, memory is strictly rationed and there's little available for such memory-intensive functions as indexing annul sorting. If you couldn't work a day without resident programs like Pro-Key or SideKick, you're strictly out of work until you add more RAM.

There are lots of little things to complain about. The report and label generators are simply terrible; while adding no new capabilities, they give you much less information and require many more steps to complete the same work. In the interac-

 If you start your word processor with a blank screen, you can record the macro with no words in the

document at all.

tive mode, the cursor jumps to line 24 each time the dot prompt appears. This makes it difficult or impossible to leave information on the screen while you ask questions, make replacements, etc.

Yes. Plus is a significant upgrade with many powerful new features. In many respects. Ashton-Tate has expanded its market downward by making dBASE easier for novices, and upward by giving professionals more control and many new functions. It's wonderful . . . but! So if you have enough disk space and can arrange to "run dual" with both versions installed for a while, take Mr. Richardson's advice and do it -Brad Stark

EASIER MACRO CREATION

Sometimes I need to record a complicated macro for use with several WordPerfect files. For example, I may need to do a series of global search-and-replace operations on each of 15 chapters in a book. Setting the macro up on the first file can be time-consuming-especially on a long file. However, I've hit on a simple solu-

By opening a dummy file only a few words long, you can program the entire macro as quickly as you can type it. Simply go through all the motions, recording the keystrokes. The dummy file is so short that otherwise-tedious search-and-replace operations take essentially no time. Once you finish recording the macro, switch to the files you want to modify and let the macro run while you do other things.

Two notes of caution: First, map out all the steps you want to take. Second, in recording the macro, you must act as if cer-

tain actions have taken place. For example, if a global replace on the dummy file has not found any target words, the cursor will remain at the beginning of the text, but you must still program in the repositioning to the top of the file (<Home> <Home> <Up Arrow>) so that the macro will work properly in your actual files.

> Samuel Himelstein Jerusalem, Israel

This is a useful tip that can be applied to almost any word processor, whether it has its own nucro facility or whether you're using it with ProKey or the like. But the dianmy file as you've described it seems like excess baggage.

If you open an empty file or, alternatively, start your word processor with a blank screen, you can record the macro with no words in the document at all. And if your word processor can handle more than one document at a time-as Word-Perfect can-you can switch to an empty document to record the macro (hit Shift-F3 in WordPerfect). Either way, you've succeeded in eliminating the inclegant chore of creating a dunmy file.

You could use a dummy file to your advantage in another way, however. Rather than filling it with random words, you could type in the words you want to search for in the real file. This will maintain the speed advantage of the dummy file while minimizing the chance of accidentally skipping a step in creating the macro.

Nor do you have to confine this trick to operations on multiple files. If the file is long enough and the macro promises to be complicated, it may pay to switch to the empty document, create the macro, switch back to the first document, and let the macro do its iob .- M. David Stone

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User-to-user



Simplify batch file branching, pipeline DOS commands, keep track of your backups, and hide/unhide your important files.

CASE CLOSED

The GETYES.COM batch branch technique in User-to-User, Volume 5 Number 8, relies on Y or N responses and works only if the number of choices is small. A better method for branching is to adapt the GETKEY.COM program on which GET-YES is based.

GETKEY reports different IF ERROR-LEVEL values for upper- and lowercase letters. It's smarter to add a line in GET-KEY that will convert all lowercase letters to uppercase. To do this, use a pure ASCII word processor (such as WordStar's N mode) or DOS's COPY.COM to create a script called GETFIX, containing the lines

```
N GETNEW COM
MOV AH.Ø
INT 16
AND AL. DF
MOV AH, 4C
INT 21
RCX
A
```

Then create the GETNEW.COM file by putting GETFIX on the same disk as DE-BUG.COM (2.0 or later) and typing

DEBUG < GETFIX

GETNEW.COM will let you work with just capital-letter values, reducing the IF ERRORLEVEL tests by half. The example in Figure 1 will let you type in either A, B, or C (or a, b, or c) and will then fig-

```
ECHO OF
ECHO Hit A, E, or C (or a, b, or c)
ECHO -- or bit O (or q) to quit --
GETNEW
IF ERRORLEVEL 82 GOTO OOPS
IF ERRORLEVEL 81 GOTO END
IF ERRORLEVEL 68 GOTO OOPS
OF ERRORLEVEL 68 GOTO OOPS
IF ERRORLEVEL 67 GOTO C
IP ERRORLEVEL 66 GOTO B
IP ERRORLEVEL 65 GOTO A
GOTO GOPS
ECHO YOU BIT A C
ECHO YOU HIT A E
 ECHO YOU HIT AN A
```

Figure 1: Sample batch file that uses GETNEW.COM to return uppercase IF ERRORLEVEL values regardless of whether you enter the upper- or lowercase version of a letter.

GOTO MENU

ure out with a minimum of tests which keys you hit.

While reducing the number of IF ER-RORLEVEL tests will speed up batch file execution, you can make your batch files run much faster by running them out of RAMdisks and arranging the tests properly. Since batch files search for labels from the top of each batch file, put nonessential statements at the bottom (and GOTO them), and put the labels that users are most likely to choose nearest the top.

Finally, don't exit with an :END label at the end of the batch file, which is the stead, execute a dummy batch file. Since DOS doesn't allow nesting of batch files, this will drop you to the DOS prompt.

Gary Later Buellton, California

ANDine any ASCII value with 223 (hex DF) will capitalize lowercase letters and leave uppercase letters alone. The logical AND operation works by comparing two values (the example below compares 1 bit at a time) and returning a 1 only when both

```
values are nonzero.
  1 AND 1 = 1
  1 AND Ø = Ø
  Ø AND 1 = Ø
  Ø AND Ø = Ø
```

223 equals binary 11011111. Capital A (decimal 65) is binary 01000001, while lowercase a (decimal 97) is binary 01100001. The AND operation on these numbers could be represented as

```
010000001 (65)
AND 11011111 (223)
    010000001 (65)
    $11$$$$1 (97)
```

ANDing either a 0 or a 1 with 1 in effect leaves the value alone, and ANDing both a 0 and a 1 with 0 in effect turns the value into a 0. The binary number 11011111 forces the 25 bit-the sixth one from the most time-consuming search of all. Inright-to become a 0 and leaves all the

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USER-TO-USER

other bits the way they were. (The rightmost bit is 20; the leftmost is 27).

The only difference between a lowercase letter and its capital counterpart is that the 25 bit is "set" (=1) in the lowercase version. ANDing it with 11011111 'unsets" the bit, changing it to a 0 and lowering the ASCII value by 32.

To reverse the process and turn capital letters into lowercase ones, use the logical OR operation to OR a value with 32.

- 1 OR 1 = 1 1 OR Ø = 1
- Ø OR 1 = 1 Ø OR Ø = Ø

32 equals binary 00100000. Since ORing either a 1 or a 0 with 0 in effect leaves the value alone, and ORing either a 1 or a 0 with I in effect turns the value into a I, the binary number 00100000 forces the 25 bit to become a 1 and leaves all the other bits the way they were.

This "sets" the unset 25 bit in an uppercase letter, changing it to a 1 and raising the ASCII value by 32.

01000001 (65) OR 00100000 (32) 01100001 (97) 01100001 (97) OR 00100000 (32)

01100001 (97)

Mr. Later's GETNEW.COM is a significant improvement over the previous GET-KEY.COM routine. Using GETNEW in your batch files will let you offer 26 choices-almost certainly enough-while keeping the number of IF ERRORLEVEL. tests to a minimum.

Of the other batch file enhancement techniques suggested, by far the most important is to run any branching batch file from a RAMdisk. The VDISK.SYS "virtual disk" comes free with DOS and is smart, flexible, and extremely easy to use. You don't even have to change any system board DIP switch settings to take advantage of a RAMdisk's speed gain.

One more note-as User-to-User readers know, DOS in fact does allow batch file nesting. To do so, preface the name of the batch file to be nested with COMMAND /C, which runs it out of a secondary command processor.

PIPELINE EXECUTION

The DOS manual defines piping (which is invoked with the | symbol) as "the chaining of programs" but shows only how to redirect the output of DIR through SORT and FIND.

 Of the batch file enhancement techniques suggested, by far the most important is to run any branching batch file from

a R A Mdisk

You can also use piping to execute several programs or commands in sequence. For instance, if you had a GAMES subdirectory and a program in it called CHESS .COM, you could first change directories

and then run CHESS by typing

CD GAMES | CHESS

If you had another game called CHECKERS.COM in the same subdirectory, you could do the above and then run CHECKERS immediately after CHESS by typing

CD GAMES | CHESS | CHECKERS

Nathan Eide Jackson, Michigan

While this doesn't work with all DOS commands, it does let you string certain operations together into one line. For instance, if you wanted to create a subdirectory called TEST, copy all the files from your current subdirectory into it, log into it, and then, to see a directory listing, type

md \test | copy *.* \test | cd \test | dir PC MAGAZINE - SEPTEMBER 30, 1986 CIRCLE 527 ON READER SERVICE CARD

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The excellent article on backups in PC Magazine (PC Lab Notes, Volume 5 Number 11) highlighted the necessity of making archive copies of your work. However, when you're shuffling floppies in and out of a PC all day, you can lose track of which disks you've backed up and which you haven't.

To get around this problem, create a tiny file on your disk called BACKD_UP .ON. One way to do this is to get into BA-SIC and type (directly, without line num-

OPEN "O", #1, "BACKD_UP.ON": CLOSE

and then hit Enter. Copy this file to your disks and correct the time and date of the directory listing with the command

 When you're shuffling floppies all day, you can lose track of which disks you've backed up. To get around this problem. create a file called BACKD UP.ON.

TYPE BACKD_UP.ON > BACKD_UP.ON

This assumes you set your system date and time correctly, of course. Then perform the actual backup process. Later, by looking at the date in the directory listing for BACKD_UP.ON, you'll be able to tell at which point during the day you backed up the disk.

Leon J. Dworsky Durham, North Carolina

You don't need BASIC to create the BACKD_UP.ON file; you can do it handily by using COPY CON:BACKD_UP.ON. And while the

TYPE BACKD_UP.ON > BACKD_UP.ON

file update method is a clever way to change the date, since if you try running the command

COPY BACKD_UP.ON BACKD_UP.ON

all you'll get is a "File cannot be copied onto itself' error message, an easier way is with the little-used directory updating

command

COPY BACKD UP.ON+ . .

A completely different approach would be to use the DOS LABEL command as a place for a date. To do so, patch COM-MAND.COM so that instead of saving "Volume in drive B: is . . . " it would say. "Backed up drive B: on" Then use LABEL to add the date. DIR would then report "Backed up drive B: on 9-10-86". If you backed up additional files later, you could use LABEL to change the date.

To patch COMMAND.COM, use the DEBUG Search command to find the 'Volume in drive'' message by typing, at the DEBUG hyphen prompt,

S 188 6888 "Volume in drive"

In DOS 3.1, the address is 4A66. Use the Enter command to change both the "Volume . . ." message and the "is" that follows. In DOS 3.1. you'd tyne

E 4A66 "Backed up" E 4A82 "on"

Then Write the changes and Ouit.

NESTED FORS

Trying to nest FOR batch subcommands usually results in a "FOR cannot be nested" error message. The solution is to load a COMMAND /C secondary command processor before the second FOR.

This technique will work more than the two levels deep shown in Figure 2. If you try this technique in direct DOS mode (rather than in a batch file), use single %

signs rather than the double % signs required for batch files. Barry Sher One minor point about loading a second-

ary command processor-DOS doesn't

New York, New York

seem especially picky about what COM: MAND/C syntax you use. All of the variations below work just fine when inserted into the examples in Figure 2: ... COMMAND /C FOR ...

- ... COMMAND/C FOR ...
- ... COMMAND /CFOR COMMAND/CFOR ...

DISAPPEARING FILES The PC Lab Notes on rescuing erased files

in PC Magazine, Volume 5 Number 7, You can hide system

files like CONFIG.SYS, VDISK.SYS, and even COMMAND.COM which can give you a small measure of security.

sparked new interest in disk sectors. By modifying the PERM.COM and UN-PERM.COM programs in Volume 4 Number 25 of User-to-User (see Figure 3), I was able to create HIDE.COM and UN-HIDE.COM to hide and unhide any pro-

A word of warning-even though you can mass-hide files by creating a HIDEM .BAT batch file with the single line

FOR %%F IN (*.*) DO HIDE %%F

you won't be able to unhide all your files

for %%a in (1 2 3) do for %%b in (A B C) do echo %%a %%b for \$%a in (1 2 3) do command/c for \$%b in (A B C) do echo %%a %%b

Figure 2: The first attempt at nesting FOR subcommands will produce only an error message: to make it work, you must insert a COMMAND/C secondary command processor before the second

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Figure 3: Instructions for creating both HIDE COM and UNHIDE COM to hide and unhide files. Type this in using a pure-ASCII word processor such as EDLIN, or WordStar's N mode-and name it SCRIPT. Make sure DEBUG.COM (Version 2.0 or later) is on yo disk, or that you've PATHed to it. Also. make sure you leave a space before the RCX and before the W. and hit the Enter key after each line, especially the last one. Then get into DOS and type DEBUG<SCRIPT to create the files. the same way, since global file characters work only on what is actually produced by a directory listing. Also, note that COM-MAND.COM will execute a hidden AU-TOEXEC.BAT file when booting up.

V. K. Taylor Barrie, Ontario Canada

You can hide such system files as CON-FIG.STS, VIDSK.STS, and even COM-MAND.COM itself, which can give your disks a bare root directory and a small measure of security. If you do try the masshide above, remember to keep UNHIDE .COM on a separate disk or subdirectory.

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PC TUTOR



Alternative approaches to ECHOing blank lines, blanking the screen with an OUT statement, and avoiding phosphor burn with the EGA. involved in maintaining batch files in a

RESOUNDING ECHOS

Several readers have pointed out that when I proposed using ASCII 255 to get DOS 3.1 to ECHO blank lines (PC Tutor, Volume 5 Number 10), an alternative solution (a patch to COMMAND.COM) had already appeared in our User-to-User column (Volume 4 Number 24).

Being a User-to-User reader myself, I was not unaware of the COMMAND .COM patch. I don't consider it to be a good solution in this case, however. In the first place, the patch doesn't really solve the problem, since for every new DOS version somebody will have to figure out where to put similar new patches.

Second, I believe that ECHO has been fixed in DOS 3.1, so patching COM-MAND.COM to duplicate the effect of an old bue just doesn't make sense to me. ECHO should not act differently if it is followed by one blank space or by two blank spaces, as it does in DOS 2.0 through 3.0. The real problem with ECHO is its stupid insistence on issuing "Echo is on" and "Echo is off" messages. If ECHO did not dish out these useless messages, it would simply echo a blank line when entered without a parameter. (The DOS ECHO command is based on its counterpart in UNIX, which has also been plagued by problems. See Kernishan and Pike's The UNIX Programming Environment (Prentice-Hall, 1984) for an extensive discussion of some of the more philosophical ramifications of the ECHO command. The

subject is not as simple as you may think.) Third, in the case at hand, the person who asked about echoing blank lines was corporate environment, where they are used on many different PCs. Patching COMMAND.COM on each of these muchines rather than changing the batch files (which require periodic redistribution anyway) didn't seem to me to be a reasonable approach. And finally, I thought my use of EDLIN, with its redirection of standard input, illustrated some valuable techniques that could be applied in other circumstances where changes must be made in several different files.

My recommendation to change the ECHO statements to echo an ASCII 255 (which displays as a blank) is not the only good fix, however. Several readers also wrote in pointing out that

ECHO. will print a blank line, as will also

ECHO:

 To print blank lines you can use a slash, backslash, double quote, left or right bracket, or a plus sign immediately following the word ECHO.

Both are cleaner and much easier to create with most text editors. Note that the period and colon must immediately follow

William A. Robinson of Solon Mills, Illinois, who has clearly done extensive research into the problem of printing blank lines with ECHO, reports that you can also use a slash, backslash, double aunte. left or right bracket, or a plus sign immediately following the word ECHO, What all these characters have in common is that they may not be used in file or command names (thus they obviously aren't part of the command), they are not delimiters, and they serve no other purpose on a consmand line (as would the angle brackets. for instance). I tested all of their under DOS 3.20 and they work. (Will they work under future DOS versions? Who knows!)

Finally, another reader suggested creating ASCII files containing the text to be displayed and using the batch file to TYPE these files to the screen after turning ECHO off. This is most useful when creating full-screen displays from batch files, since you can put ANSI control sequences in the file for moving the cursor around and highlighting.

There are, then, numerous ways to solve the blank-line ECHO problem under DOS 3.1. and I want to thank everyone who has contributed to the discussion.

IDENTIFYING DISPLAYS

I develop applications with the BASIC interpreter, then eventually compile them with Microsoft QuickBASIC. I use a technique to blank the screen while text is be-

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■ PC TUTOR

ing written to it. This results in a nice, professional-looking video screen that flashes on all at once, rather than visibly being drawn one line at a time.

To turn the display off, I use the statenent:

OUT 984,1

and to turn it back on: OUT 984.41

This works perfectly with an IBM or compatible color/graphics adapter. The problem is that my programs must also run on some Hercules Graphics Cards (and Hercules Clones), and my technique just doesn't work with those boards. I also use different video pages in my programs, and these, too, are ignored by the Herc eard. How can I identify a Hercules Graphics Card and compensate for the differences? Bob Gross

Newport Beach, California

I'll bet your technique won't work on regular od IBM Monochrome dalpers, either. The port you are manipulating is the "Mode Control Port Register," which has a different address on color adapters timelang monochrome dapters timelang the Hercules Graphics Card). The Control Port of for monochrome displays is at address 952 or rather than 984. (In hexadecimal, these addresses are 388 and 3188.)

You can blank an IBM Monochrome Adapter or Hercules Graphics Card with the statement

OUT 952,1

and unblank it by issuing

OUT 952,41

but that's not the best way to do it. The Control Port address is always 4 higher than the I/O address of the 6845

video chip. That port address is a word (2 bytes) stored at the hexadecimal address 0040.0063 in the BIOS data area. So, you can define a variable for the Control Port thus:

DEF SEG-1848
CTRLFORT - 4 + 256 * PREK(1864) + PREK(1863)
Now you can simply use the variable
CTRLPORT instead of 984 or 952.

You won't be able to use separate video pages on an IBM Monochrome Adapter or

the Hercules Graphics Card, however, so, unless you want to write alternative code for the monochrome boards, it's easier to avoid using video pages altogether. (If you must use video pages, you can still use the value of CTRIPORT to also identify the

type of adapter.) In general, however, the best way for your programs to identify the video display is to ask the user on-screen. This is nothing to be ashamed of. I think you'll find that most software that does anything beyond plain vanilla text output requires some sort of installation program where the user must identify his display. True, some really big-league stuff like Microsoft Word can adapt to different displays without being told, but then we're talking about a 44K WORD.COM program (in Version 3.0) that identifies displays and provides drivers for them. We're also talking about programs by experts in the field.

grants of experts on mig. use or a real explacion in video adapters, and it's going to get tougher and tougher to write programs that work with all of them. The EGA is just the beginning. (And by the way, the above technique of blanking the screen with work on an EGA, but it won't do any mark, either.) This is one reason why the graphics device interface of Microsoft Washows is so important to the future of Washows is so important to the future of ity of dealing with the hardware so that you can concentrate on the program.

EGA SCREEN BLANKER

A number of PC Tutor readers have castigated me for recommending that EGA users with monochrome displays prevent monitor phosphor burn simply by using the brightness control rather than by using a resident "screen-blanking" utility (see "Burning in a Screen Image," PC Tutor, Volume 5 Number 12). Some clearly felt slighted by my "flippant" suggestion that when their monitors burned out they could buy an Enhanced Color Display, instead, It never occurred to me that some people consider their "green screen" a matter of choice and might actually prefer it to even a high-resolution color display. (I'd figured that monochrome users were more to be pitied than censured for having to endure the short-sighted decisions of their DP departments.)

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board restores the display to normal. You can create EGABLANK.COM by PC MAGAZINE - SEPTEMBER 30, 1986

■ PC TUTOR

N EGARLANK COM JMP 0153 ; JMP INITIAL DW 8, 8 DM 8

CS: ; NEWINTS: CMP WO [818A],+88 ; Check COUNTDOWN JE 8122 ; If zero, DONOTHING DEC WO [818A] ; Occrement COUNTDOWN JNZ 8122 ; If not 8, DONOTHING

PUSH AX MOV AL,00 ; Byte to turn off CALL 0142 ; Call ONOFF POP AX JMP FAR [8102] / Jmp OLDINTS

CS: / NEWINT9: CMP WO [918A],+88 ; Check COUNTDOWN JN2 8136 ; If non-zero, OK PUSH AX MOV AL,28 ; Byte to turn on CALL 8142 ; Call ONOFF

POP AX MOV NO [818A],2888 ; Set COUNTDOWN

JMP FAR [#186] | Jmp OLDINT9 PUSH OX | ONOFF: PUSH AX HOV DX, \$38A ; Reset flip-flop

IN AL,DX ; for monochrone MOV DX,#3DA ; Reset flip-flop IN AL,OX ; for color MOV DX,03C0 ; Attribute Port POP AX

OUT DX.AL : Turn on or off

MOV AX,3500 ; INITIAL: cs: DV [#1#2],BX ; Save OLDINTS

CS: MOV [8184],ES MOV OX,818C MOV AX,2588 Set NEWINTS

TNT 21 MOV AX,3509 INT 21 CS:

MOV [#186],BX ; Save OLDINT9 MOV [8188],ES

MOV OX,8127 / Set NEWINT9 MOV AX,2589 INT 21 MOV OX,8153 / Bytee for reeident INT 27 / Terminate

p cv

Figure 1. Use DEBUG with this script file to create EGABLANK.COM, an automatic screen-blanking utility far the Enhanced Graphics Adapter.

OK, OK, I got the message. Figure 1 contains a script file that will create a resident screen-blanking utility for the EGA. Once EGABLANK is loaded, if you don't

typing the lines shown in Figure 1 into an ASCII file called EGABLANK.SCR. (You don't need to type in the semicolons or anything to the right of them; these are comments to help you understand what's going on in the program.) When you have EGABLANK.SCR done, run

DEBUG < EGABLANK . SCR

and DEBUG will create EGABLANK .COM for you. Then load EGABLANK and try it out by sitting in front of your PC for 71/2 minutes without doing anything until the display goes blank.

You can chauge the amount of time EGABLANK waits before blanking the screen by changing the hexadecimal value 2000 in the line

MOV WO [@1@A].2@@@

to something else. A value of I will blank the screen every 55 milliseconds. Going up to FFFF gives you about an hour before the lights go out. This program is only for the EGA and

EGA compatibles. It will not work with other adapters, though it won't harm them, either. While it is really intended only for the monochrome display (these are the ones susceptible to phosphor burn), it will also work with a color display attached to an EGA. Under extremely unusual circumstances, it could interfere with a program engaged in setting the EGA palette registers, but that contingency is so remote I wouldn't worry about it.

What I would worry about is this: EGA-BLANK will not work well with programs that entirely steal the keyboard interrupt. since it then has no way of knowing when keys have been struck. If you have any of these programs, you probably know about this, since other resident programs won't work with them either. Some more-sophisticated commercially available screen blankers continually check the contents of the screen for changes to get around this problem, but that would be beyond the scope of a simple remedy.

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type anything for 71/2 minutes, it will blank

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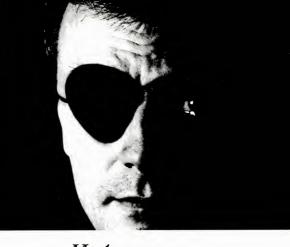
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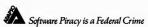
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THE CHEAPEST PCs EVER As prices drop, IBM continues to lose its dominance in the inexpensive PC market. Compatible knockoffs, assembled and packaged by a wide variety of marketers, are appearing in record numbers. But let the buyer beware. There are many things to consider before venturing into these relatively uncharted waters. PC Magazine Labs puts 18 inexpensive PCs and XTs through their paces, and Paul Stafford reports on the possibilities and the realities of this new market under \$1,000.

SPECIAL REPORT: LASER DRIVES

The same technology that is causing a revolution in the audio entertainment industry is asserting itself in the world of the PC-but for different reasons. John Helliwell presents an overview of writeonce, read-mostly (WORM) laser drives and explains how their potential database applications can be useful with a PC.

THE PLOTTERS KEEP COMING

As high-quality graphics become more and more a part of many work environments, interest in plotters continues unabated. Since last December, when PC Magazine reviewed 24 plotters, many new models have been introduced. In the first of a two-part survey, Glenn Hart reviews five desktop plotters that accommodate paper ranging from 81/2 by 11 inches to 17 by 22.

SPREADSHEETS AFTER 1-2-3 Can any spreadsheet package challenge 1-2-3 and come away looking good? Jared Taylor reviews three inexpensive programs that aim to give 1-2-3 a run for its money.

BYTE-LEVEL EDITING Using the DEBUG program on your DOS disk is one way to recover erased files, change any byte on any disk, or even disassemble programs to see how they work. But all these tasks are far easier with a byte editor program. Winn L. Rosch reviews six such programs and explains their many uses.

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Improves line of sight for portable computers tool

Conveniently stores paper underneath, improves line of sight to printout, removable paper fray catches and folds printouts outomatically.





Totally universal. Heovily constructed components, colored and textured to match or complement oil microcomputer systems.